

# NATIONAL CAR-BUILDER

VOLUME XL,  
NUMBER 7.

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Harlan & Hollingsworth Co., Wilmington, Del.....	xiii
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J. M. Jones & Co., Schenectady.....	viii
Michigan Car Co., Detroit, Mich.....	iii
Mowry Car and Wheel Works, Cincinnati, O.....	iii
New England Car Co., Boston, Mass.....	128
John Stephenson & Co., New York, N. Y.....	xv
Wason Manufacturing Co., Springfield, Mass. (cover).....	3
CAR BRAKE SHOES:	
Congdon Brake Shoe Co., Chicago, Ill.....	xi
CAR BRASS GRINDING MACHINES:	
Tambs Co., Stroudsburg, Pa. (cover).....	4
CAR COUPLERS:	
E. P. Dwight, Philadelphia, Pa.....	vi
CAR GLASS:	
Tapp, W. Morris & Co., 27 Chambers st.....	vi
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Gardner's Perforated, 183 Canal street, New York.....	ii
Hale & Kilburn Mfg. Co., Phila, Pa.....	120
Herz & Co., 313 East Twenty-second st., N. Y.....	xiii
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Boston Car Spring Co., 60 Federal st., Boston.....	xiv
Columbia Car Spring Co., 322 Seventh avenue, N. Y.....	vi
Culmer Spring Co., Pittsburgh, Pa. (cover).....	2
Detroit Car Spring Co., Detroit, Mich.....	iii
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Miller, Metcalf & Parkin, Pittsburgh, Pa. (cover).....	3
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West Bergen Car Spring Co., 5, 7, 9, 11, New York.....	iii
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Rubber Step Mfg. Co., Boston, Mass.....	125
CAR TRUCKS:	
Thurston Truck Co., Chicago, Ill.....	ii
CAR WHEELS:	
Allen's Paper Car Wheel Co., 240 Broadway, N. Y.....	xii
Baltimore Car Wheel Co., Baltimore, Md.....	120
Bowler, Maher & Brayton, Cleveland, O.....	xiv
Cayuta Wheel & Foundry, Waverly, N. Y.....	125
Cooper Elastic Steel Wheel Co., Cambridgeport, Mass.....	120
Davenport, Fairbairn & Co., Erie, Pa.....	iv
Detroit Car Wheel Co., Detroit, Mich.....	iii
Jersey City Wheel & Foundry Co., Jersey City, N. J.....	xiv
Lehigh Car Wheel Co., Wilmington, Del.....	iii
Maher & Brayton, Cleveland, O.....	125
Mowry Car & Wheel Works, Cincinnati, O.....	iii
Rampage Wheel & Foundry Co., Ramapo, N. Y. (cover).....	3
Taylor Iron Works, High Bridge, N. Y.....	ii
A. Whitney & Sons, Philadelphia, Pa.....	125
CEMENTS:	
S. L. Merchant, 41 Broadway, N. Y.....	xiii
DESKS:	
Moore's Patent Combination Desk, Indianapolis, Ind.....	xi

## CONTENTS.

### A FULL REPORT OF THE PROCEEDINGS

### OF THE MASTER CAR-BUILDERS' ASSOCIATION AT DETROIT, June 8, 9 and 10, 1880.

EDITORIALS:	PAGE.
The Car-Builders' Convention at Detroit.....	122
MISCELLANEOUS:	
A New Directors' Car.....	123
The Allen Paper Car Wheels.....	124
Exhibition of Car Appliances at Detroit.....	124

DRAW-BARS:	
Butler's Excelsior, Cincinnati, O.....	iv
Continuous Draw-Bar Co., Cincinnati, O.....	129
J. B. Safford, Buffalo, N. Y.....	129
DRILLS:	
Morse Twist Drill & Machine Co., New Bedford, Mass.....	xiii
The Taithe Co., Stroudsburg, Pa. (cover).....	4
FLEXIBLE SHAFTING:	
Stow Flexible Shaft Co., Philadelphia, Pa.....	iv
FROGS & CROSSINGS:	
H. & H. Elliot, East St. Louis, Ill.....	i
GRAIN DOOR:	
Van Lue's, Aurora, Ill.....	125
HAND CAR:	
Sheffield Velocipede, H. W. Peabody & Co., Boston, Mass.....	iv
HYDRAULIC JACKS:	
R. Dugison, 24 Columbia st., New York.....	125
INJECTORS:	
"Hancock Inspirator Co." Boston.....	120
JOURNAL BEARINGS:	
George E. Menesty & Co., West Troy, N. Y.....	120
Phosphor-Bronze Smelting Co., Philadelphia, Pa.....	xiii
LEATHER:	
T. P. Howell & Co., 77 Beekman st., N. Y.....	120
LIFTING JACK:	
Joyce & Tridand, Dayton, O.....	128
LOCOMOTIVES:	
Baldwin Locomotive Works, Philadelphia, Pa.....	120
Hinckley Locomotive Co., Boston.....	120
LOCOMOTIVE BRASS AND COPPER TUBES:	
Wallace & Sons, New York (cover).....	4
LUBRICATORS:	
Albert Bridges, 40 Courtland st., New York.....	xiv
Eagle Car-Box Lub. Co., New York.....	xiii
A. Middleton, 945 Ridge ave., Philadelphia, Pa. (cover).....	2
LUMBER:	
Gardner & Spiry, Chicago (cover).....	ii
MACHINERY:	
S. C. Forsaith & Co., Manchester, N. H.....	xii and xiv
Holliston Machine Co., Fitchburg, Mass.....	xiv
MAHOGANY, FANCY WOODS & VENEERS:	
J. Couper, Son & Co., 432 Washington st., N. Y.....	xii
John R. Graham, New York.....	iv
C. C. Houghton & Sons, 8 Howard street.....	iii
J. H. Monmouth, 151 Centre street, New York.....	xii
Geo. W. Read & Co., 180 Lewis st., N. Y.....	xiv
John E. Wood, Boston, Mass.....	vi
The E. D. Albro Co., Cincinnati, O. (cover).....	2
MARGUERITE:	
J. Berni, 101 Greene st., N. Y.....	xiii
NUT LOCKS:	
J. Berni, 101 Greene st., N. Y.....	127
OIL-BOX COVERS:	
Vulcanized Fibre Co., Wilmington, Del.....	xi
OILS:	
Galella Oil Works (Limited), Franklin, Pa.....	xiv
Johnston Graphite Oil Co., New York.....	xii
Plumbago Oil Co., Rochester, N. Y.....	125
PAINTS:	
Iron clad Paint Co., Cleveland, Ohio (cover).....	2
St. Louis Impenetrable Paint Co., St. Louis. (cover).....	2
PAINTS:	
Bradley & Co., Syracuse, N. Y.....	iv
Chas. H. Justice, Philadelphia.....	xii
PUMPS:	
A. T. Stewart & Co., New York.....	viii
PULICATIONS:	
The "Railway Engineer," London, Eng.....	xiii
PUMPS:	
Gould's Manufacturing Co., Seneca Falls, N. Y. (cover).....	2
H. R. Worthington, 239 Broadway, New York. (cover).....	2

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RAILROAD SUPPLIES:	
L. G. Thilston & Co., 5 and 7 Dey st., New York.....	ii
RECKING CHAIRS:	
Marks, New York City.....	xiii
RAILROAD TIES:	
Bentley, Gildersleeve & Co., New York.....	iv
SAFETY-NUT:	
The Alwood Safety Nut Co., Springfield, Mass. (cover).....	3
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S. Hartshorn, 430 Broadway, N. Y.....	viii
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SIGNALS:	
Union Electric Signal Co., Boston, Mass.....	iv
STEAM FORGES:	
Baugh Steam Forge Co., Detroit, Mich.....	iii
Holt's Portable Forge Co., Cleveland, O.....	vi
Keystone Portable Forge Co., Philadelphia, Pa.....	xii
Cleveland Steam Gauge Co.....	iii
STEEL-IRON:	
W. D. Wood & Co., Pittsburgh, Pa. (cover).....	3
STEEL:	
Crescent Steel Works, Pa. (cover).....	3
Midvale Steel Works, Philadelphia, Pa.....	125
Standard Steel Works.....	xiv
Thomas Turton & Sons, Boston, Mass.....	iii
STEEL CASTINGS:	
Chester Steel Casting Co., Philadelphia, Pa.....	ii
Eureka Cast-Steel Co., Philadelphia, Pa. (cover).....	3
Midvale Steel Works, Philadelphia.....	125
STEEL TIRES:	
Midvale Steel Works, Philadelphia.....	125
SCREW JACK:	
E. L. Morse, St. Louis, Mo. (cover).....	2
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M. H. Tarbox & Co., Lockport, N. Y. (cover).....	3
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The Pratt & Whitney Co., Hartford, Conn. (cover).....	2
TELESCOPE JACK:	
Albert Bridges, 40 Courtland st., New York.....	129
TIN AND ROOFING PLATES:	
Mercantile & Co., 325 Arch st., Philadelphia, Pa. (cover).....	4
TRUCK TOOLS:	
Metcalf, Paul & Co., Pittsburgh, Pa.....	xiv and 127
TRUSSON PLATES:	
Ambruse Ward, Altoona, Pa.....	xiii
VARNISHES:	
John Babcock & Co., Boston, Mass.....	viii
Berry Brothers, Detroit, Mich.....	vi
Burphy & Co., Newark, N. J.....	i
Parrott Varnish Co., Bridgeport, Conn. (cover).....	4
E. Smith & Co., 138 William street, New York.....	ii
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Globe Ventilator Co. (cover).....	4
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T. Lewis & Brothers, Philadelphia, Pa.....	viii
WIRE FENCE:	
American Fencing Co., New York (cover).....	2
Thorn Wire Hedge Co., Chicago.....	125
Washburn & Moen, Worcester, Mass.....	xiii
WOOD MILLER:	
Brookfield Wood-Finishing Co., 40 Bleeker st., N. Y. (cover).....	2
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J. A. Fay & Co., Cincinnati, Ohio.....	v
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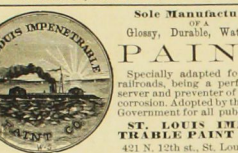
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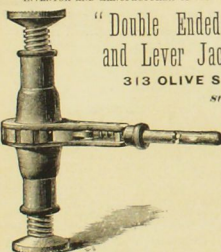
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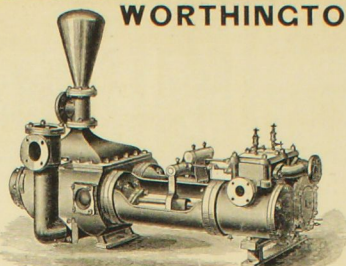
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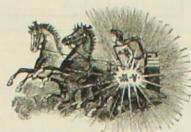
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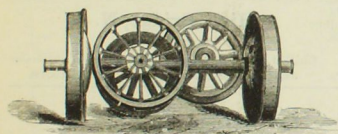


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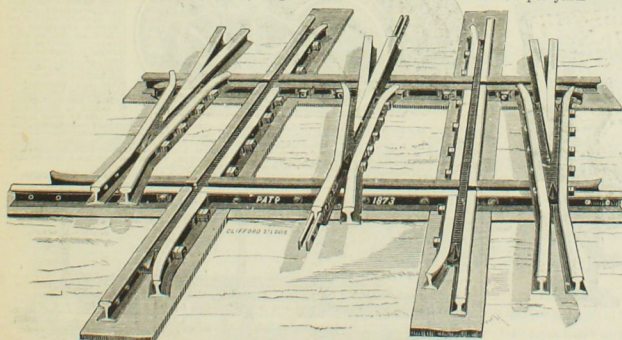
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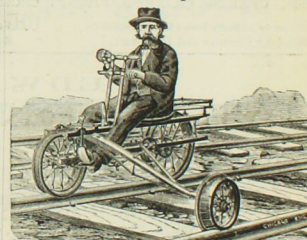
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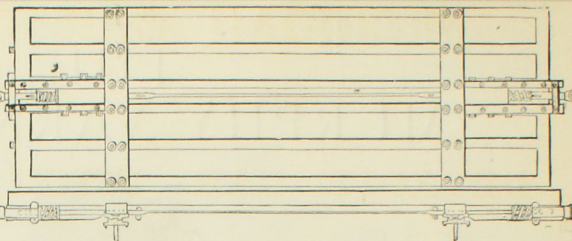
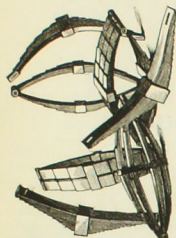
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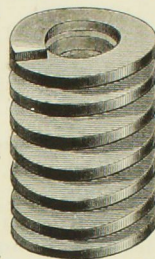
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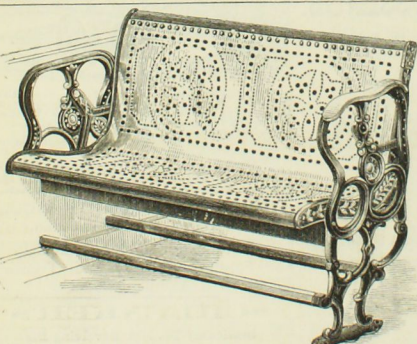
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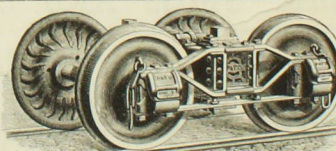
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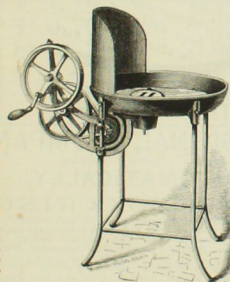
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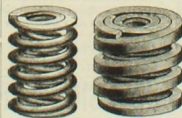
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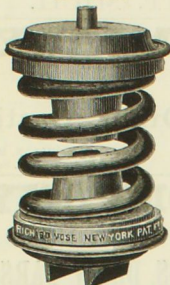
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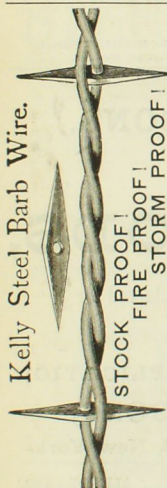
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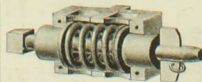
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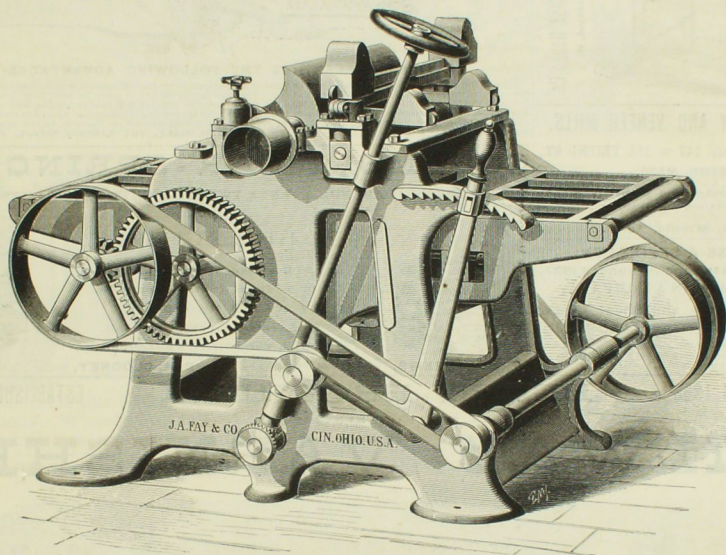


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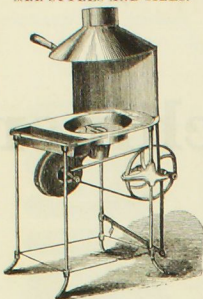
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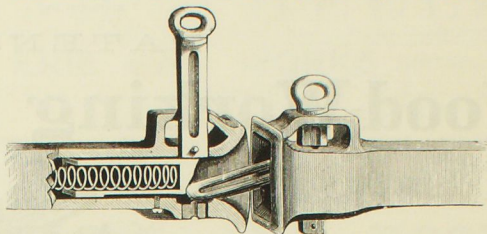


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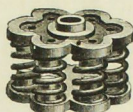
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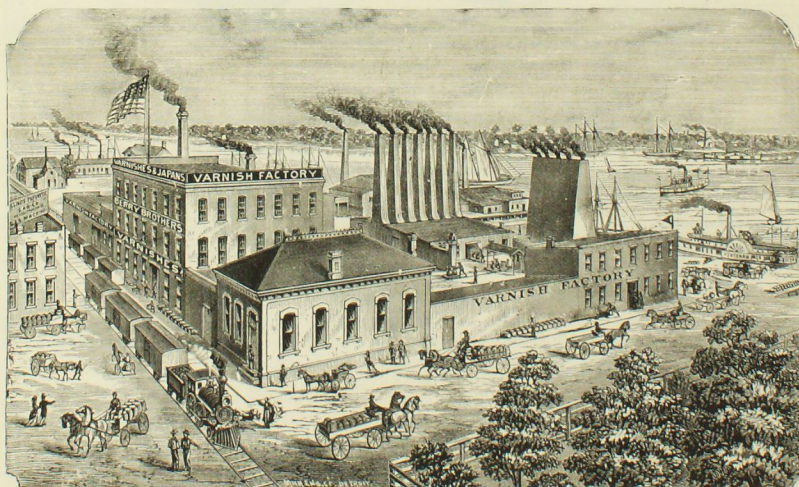
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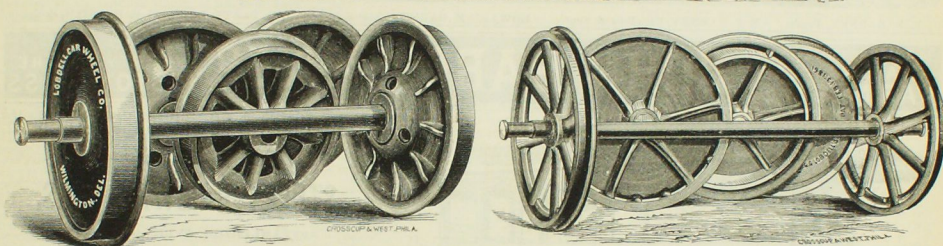
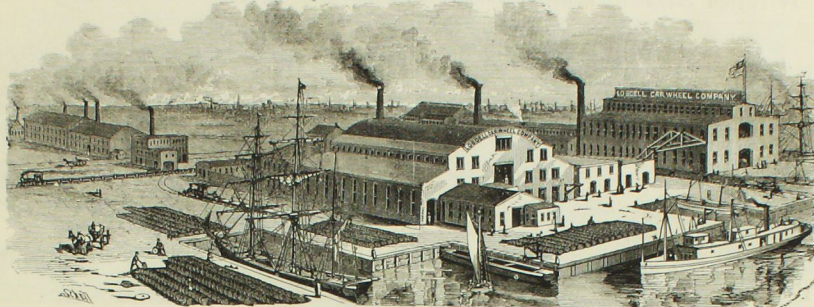
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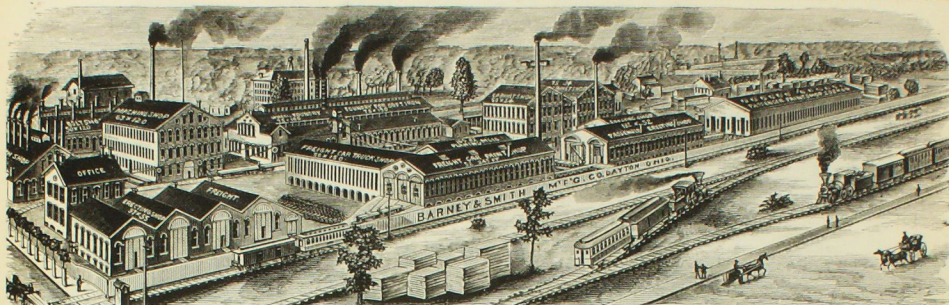
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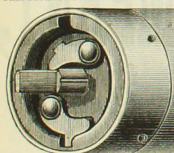
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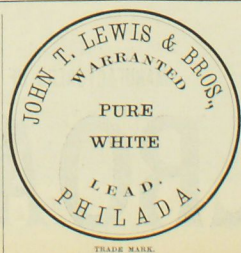
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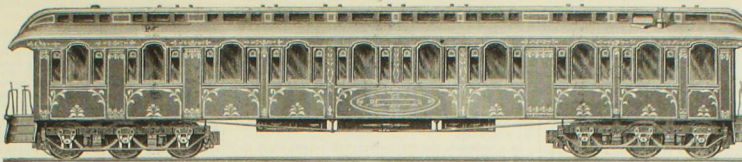
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DEVOTED TO THE INTERESTS OF RAILWAY ROLLING STOCK.

VOLUME XL  
NUMBER 7

JULY, 1880.

(SINGLE NUMBERS, TEN CENTS.  
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## The Master Car-Builders' Association.

### REPORT OF THE PROCEEDINGS OF THE FOURTEENTH ANNUAL CONVENTION.

The delegates to the fourteenth annual convention of the Master Car-Builders' Association assembled on Tuesday, June 8, 1880, in the City Council Chamber at Detroit, Mich. The convention was called to order by the President of the Association, Mr. Leander Garey, of the New York Central & Hudson River Railroad.

#### SPEECH OF WELCOME.

The President then introduced Judge Chipman, of Detroit, who addressed the convention as follows:

GENTLEMEN OF THE CONVENTION.—In the absence of my esteemed friend, the Mayor of the city, the privilege has been accorded me to welcome this very respectable and influential body to the city of Detroit.

You represent, gentlemen, a great industry, and great industries are always welcome to this city; for, although Detroit has had the reputation of being somewhat slow, yet, as a manufacturing point it has become of great importance, and in no city of the country is the benefit of large manufacturing interests felt more than in the city of Detroit. They bring to us thousands of men, and they dot our city over with the homes of honest mechanics and laborers, and in that regard we find them to be a benefit of untold importance; and so I welcome you, not only as guests, but I ask you to come here to stay, bring your factories with you; we will give you such a support, such a welcome, as members of our own household, as will gladden your hearts.

There is nothing more wonderful than the progress which has been made in the art of car-building, and nothing can illustrate that progress better, perhaps, than the sight of your faces here to-day. I see before me no man, hardly, who has passed middle-life. Most of you are young men, and during the short period of your lives the changes which have taken place in the construction of railroads and their equipments are as wonderful as the changes which have occurred in any branch of industry known to the world. I remember, gentlemen, when upon this spot, and the spot covered now by the Detroit opera-house, old-fashioned flat-railroads found their depots, and when the clumsiest, the most awkward and uncomfortable of compartment cars were used instead of the elegant coaches of the present day; and so in regard to the cars for traffic, the changes in them have been of a most wonderful character; and I need not say to you that this improvement in our railways, this improvement in the peculiar branch of industry to which you, gentlemen, are devoted, epitomizes, so to speak, the wonderful increase of this country in power and in glory, and that when we read the history of what you have accomplished, we read the history of the wealth and of the power of the American people.

There are some things, gentlemen, I might suggest to you, in which improvements might go on still farther. It is just possible you might invent an automatic brake-man who will never see a railroad company for the loss of a finger, or a dead-wood which will not cripple a brakeman of flesh and blood. It is possible, too, that some of you may invent an engineer, who will never go to sleep when running a train; but the crowning glory reserved to you would be, if you could invent a railroad manager who, under all circumstances, would look out for the interests of the kindliest feelings of the men, you would include in your invention one who would always care for the interests of the car companies.

However this may be, gentlemen, we welcome you here most cordially. We hope that you will stay as long, not only as you may desire to remain, but we hope you will stay as long as you are comfortable and happy here. And if you stay as long as that, I think you will never want to leave. You will find warm hearts here, you will find the language of friendship, you will find every facility given you in your deliberations, you will find that the whole city is full of all these kindly feelings and hospitalities which adorn nature, and we understand you, gentlemen, by the reputation which has preceded you, to be intelligent, and worthy in all respects of the kindest feelings of the most liberal and the most generous hospitality. Your fame has preceded you and I will say what I believe to be the voice of our business men and what is the universal feeling of the people of the

city of Detroit, we esteem it a great honor that a convention so important has selected Detroit as the scene of its deliberations. We know how large the interests are which are entrusted to you. We understand that you are representative men of one of the greatest industries in the world, and we are glad to have you here; glad of the prominence it gives Detroit to be the scene of your deliberations, glad to have you go through our streets, mingle with our people and go forth and give, what, in spite of our modesty, we expect to be, a very favorable account of the city of Detroit and of its people.

Again I welcome you, gentlemen, and hope this may not be the last occasion on which you will honor the city by holding your convention here. We would like to see you as often as you choose to come, not simply as a convention, but we would like to meet you all as individuals. Wishing you, gentlemen, every success in your deliberations, I now bid you good morning.

The roll was then called, and the following members answered to their names:

F. D. Adams	Boston & Albany
W. H. H. Allison	Cincinnati, Hamilton & Dayton
The Atchafalaya	Kansas City, St. Joseph & C. Bluffs
John H. Baugh	Steam Forge Car Works, Detroit
H. S. Billings	Pullman Palace Car Co.
R. C. Blackall	Delaware & Hudson Canal Co.
K. A. Blackwell	Chicago & Grand Trunk
Wm. Campbell	Chicago & Northwestern
F. Childs	Great Western, of Canada
J. V. Coon	Proy & Boston
H. L. Cooper	Lake Erie & Western
N. J. Coulter	Ohio & Mississippi
S. A. Davis	Nashua & Lowell
G. W. Davenport	Erie Car Works
W. H. Darnest	Northern Central
The G. Dunn	Chicago & Grand Trunk
S. Griffith	Chicago & St. Louis
M. P. Ford	Pittsburg, Cincinnati & St. Louis
M. S. Forney	National Gazette
C. E. Garey	New York & Harlem
Leander Garey	New York Central & Hudson River
J. H. Gorman	Lake of Cin., LaSayette & Chicago
B. J. Gregg	Cincinnati, Sandusky & Cleveland
D. A. Hopkins	Hammond & St. Joseph
J. G. Horman	Harrisburg Car Co.
W. T. Hildrup	Champlain, Havana & Western
H. S. Hindekoper	New York Central & Hudson River
David Hoyt	Late of Erie Railway
U. H. Koller	Buffalo & Southwestern
Israel Lee	New York Central & Hudson River
J. L. Leighton	Flint & Pere Marquette
John S. Leutz	Lake Shore & Michigan Southern
Wm. Johnson	Valaish, St. Louis & Pacific
Sanford Keeler	Pittsburg, Ft. Wayne & Chicago
John Kirby	Late of New Haven Car Co.
U. H. Koller	Lehigh Valley
Israel Lee	Grand Trunk
J. L. Leighton	Michigan Car Co.
Wm. McWood	Flint & Pere Marquette
John McLean	New York, Lake Erie & Western
Reuben McPherson	N. York Central & Hudson River
W. H. Paige	Canada Southern
S. A. Davis	Wagon Car & Mfg. Co.
J. H. Raymond	Illinois Midland
A. J. Random	Western Railroad Association
H. S. Billings	Indianapolis & St. Louis
Henry B. Stone	Union Pacific
D. A. Hopkins	Chicago, Burlington & Quincy
H. B. Titus	Milwaukee Car
Wm. Van Vleet	South-Central
Earl Varney	New York, Lake Erie & Western
E. K. Verbyck	Fitchburg
Geo. Watson	Chicago, Rock Island & Pacific
Joel West	Detroit, Lake Erie & Western
P. W. Wier	Chicago, Burlington & Quincy
L. S. Young	New York, Lake Erie & Western
	Cleveland, Col. & Indianapolis

The following new members joined the Association by signing the certificate: Reuben McPherson, Joel West, K. A. Blackwell, Robert Potts, H. S. Hindekoper, Henry B. Stone, James McGregor, Joseph Taylor, J. Van Vechten and B. J. Gregg. The roads represented by them will be found by reference to the above list.

#### ADDRESS OF PRESIDENT GAREY.

MR. L. GAREY, the President of the Association, then delivered his annual address, as follows:

GENTLEMEN OF THE ASSOCIATION.—I am happy to again meet you in convention. The past year has demonstrated the capacity of our railroads to meet the most rapidly increasing demand for transportation ever

witnessed in this country. The increase in quantity of the various products of the country, added to the imports moved by rail, has more than doubled during the past ten years, and we may reasonably expect that the railroads will be called upon (in a few years) to carry double the tonnage they are now prepared to move with the present rolling-stock.

There are times during each year, even with the present number of cars, that managers are bothered to find storage room for idle cars, while in busy times it is impossible to furnish the number required.

The ordinary ten-ton car has been loaded with from twelve to fifteen tons, thus adding about one-half to the carrying capacity of freight cars, while most of the cars built during the past year have been designed to carry fifteen, and in some cases twenty tons each.

It is evident from past experience that in a short time the maximum load for eight-wheel freight cars will be at least twenty tons, while four-wheel cars will be loaded with from ten to twelve tons each. Master car-builders should therefore to anticipate rather than be forced to make the necessary changes in designs and construction of the various classes of cars for moving freight.

I cannot let this opportunity pass without calling attention to the old subject, uniformity in cars for interchange traffic.

The present time appears to be most appropriate for an earnest effort by all master car-builders to agree unanimously upon what shall constitute a standard box freight car, as the old ten-ton car will soon be of the past, while the car of the future will have a carrying capacity of at least twenty tons.

Our experience during the past year has proven the value of a standard car axle and your wisdom in making the size larger than those in general use, and if the standard axle had been more generally put in use, railroads would now be better equipped to increase the allowable tonnage of cars.

I would call attention to the various lengths of gauges used for setting wheels for the same gauge of track, and ask, if possible, a standard length be established by which all can be governed.

I have the pleasure to announce that your committee to prepare a dictionary of terms, have completed the duties assigned them, and are now ready to exhibit the result of their labor.

The thirteen annual meetings of the Association have been much benefit to the public. It has been thought that by a reorganization our meetings could be made more interesting.

#### CAR-BUILDERS' DICTIONARY.

MR. FORNEY, from the committee on this subject, presented the following report:

To the Master Car-Builders' Association:

The Committee to whom was delegated the duty of compiling a "Dictionary of Terms," took great pleasure in reporting that they have at last completed their task, and a copy of the book is submitted herewith.

At the meeting held in 1878 your Committee reported that they had then collected 1,300 terms, and that a dozen or more large drawings have been required and many smaller ones will be needed before the work is completed. At that time a blank form was also submitted, showing the size that the book was expected to be.

To show how much greater the work has been than was even then anticipated, it may be said that the number of pages in the volume before you is more than double that of the blank form submitted two years ago. The number of terms, instead of being 1,300, is between 2,400 and 2,500. There are 15 double-page engravings, over 70 which occupy a full page, and over 800 engravings altogether.

The cost of the book has thus been nearly double what was estimated by all the unjudicious members, who had no pecuniary interest in the matter, therefore felt justified in consenting that the retail price for the book should be fixed at \$2, instead of \$1.75 as was originally proposed by the publishers. They will, however, furnish it in orders of ten copies at the price originally named.

The committee do not expect that they will be able to convey to the members of this Association any adequate idea of the time consumed or the labor required in doing the work which you assigned to them. The following extract from the preface indicates, however, the amount of work required and also the general character and scope of the Dictionary.

Early in the history of the Master Car-Builders' Association



tion, this subject attracted attention, and in 1871 a committee was appointed to prepare a "Dictionary of Terms used in Car-Building." This committee originally consisted of eight or ten members, who at the time were not very numerous, and who, by their efforts, accomplished much, and it soon became apparent that it was too unwieldy to do the work which had been undertaken. It was finally narrowed down to those members whose names appear on the title page of this book, who were courageous enough to undertake the task of compiling the work, and who, probably because they were then quite ignorant of its magnitude.

The first plan was to give, as far as possible, the names of all the parts of cars and their synonyms in use in different parts of the country. This was soon found to be a task which the book much larger, and the vocabulary much more cumbersome than seemed desirable, and at the same time, would rather add to than diminish the existing confusion. The committee, therefore, resolved to confine its labors chiefly to selecting and assigning appropriate terms to those parts and objects which are in common use, and which pertain to railroad cars.

It should be noticed, too, that to supply the want which demanded such a vocabulary, what might be called a double dictionary is needed. Thus, supposing that a car-builder in Chicago received an order for a *Journal-box*, by looking in an alphabetical list of words he could readily find that term and a description and definition of it. But, suppose he wanted himself to order such castings from the shop in Albany, and did not know their name; it would be impracticable for him to commence at A and look through to Z, or until he found the proper term to designate that part. It was, therefore, necessary in the dictionary of this kind, to provide the most copious illustrations and arrange them in some systematic way, so that the person might find the representation of any part of a car he might have in mind, and from that illustration find the name. The manner in which this want has been met is fully described in the "Directions for using the Dictionary" which follow the preface.

The system of abbreviations employed in "Knight's Mechanical Dictionary" has also been adopted here. Thus, under the term *Acle*, there are references to *Master car-builders standard acle*, *angle acle*, *street car acle*, etc. Under the word *Bar* a list of various kinds of bars, such as, *arch bar*, *guide bar*, *long bar*, etc., is given. This affords very material in finding terms.

Of the defects of the book, and its incompleteness, no one can so well be informed as the Committee who are its sponsors. Several years' time would be too little to devote to the completion of such a dictionary, if completed in its entirety. At and if more care could have been given to the preparation of the material in the book, it could have been confined within considerably smaller limits, but at the same time more thorough investigation would have increased the vocabulary very much in other directions. In fact there is hardly any limit to the scope which such a book might cover. It was at one time intended to give the names of all the different materials used in car-building, and a good deal of data was collected for that purpose; but it was found that to do so would involve more time and labor than the Committee could devote to it, and therefore that part of the work had to be omitted.

Of the philological qualifications of the Committee for their work, it perhaps need only be said, to disarm criticism, that none of its members knows any other language than their own is inherited, and that very imperfectly. Two of them are practical car-builders, and are in charge of the cars of one of the largest and most fully equipped roads in the country; and the compiler, during all the time that the book was in preparation, was actively engaged in the work of a technical paper. The only time any of the members of the Committee could give to the dictionary was by being called out from his other duties. They are therefore constrained to submit their work to the public, knowing its imperfections and how much it might be improved, if the necessary labor could be devoted to it. They try, however, it will prove useful in some language where no one there is well nigh a Babel of confusion."

Great difficulty was encountered in devising a system of classification for the terms, and it is feared that in some cases persons who have not informed themselves of the plan on which they are arranged may have some trouble in finding what they are in search of. To meet this difficulty what are considered very explicit "Directions for using the Dictionary" are printed at its beginning. To make this final report complete these directions are given herewith, and are as follows:

#### "DIRECTIONS FOR USING THE CAR-BUILDERS' DICTIONARY."

"When it is desired to find the meaning of a given word or term, refer to it in the alphabetical list printed on tinted paper, where a definition or explanation similar to those contained in ordinary dictionaries, and a reference to some engraving illustrating the object—if it is capable of such illustration—will usually be found.

"To find the name of a car or part of a car, let the reader examine a list of the different classes of engravings in the index which follows these directions, until he finds the class to which the object he is looking for belongs. By referring to the engravings included in that class he will usually find a representation of the object. If the engraving is of a single object its name will be found underneath, but if it consists of several or many parts, these will each be numbered, and a list of the names of the parts, arranged alphabetically, will follow. Their numbers, is given at the beginning of the class to which the engraving belongs. If the list is not on the same page a running line over the engraving usually refers to the page on which it can be found.

"Thus, suppose the reader wants the name of the longitudinal timbers under the floor of a freight car nearest the center. These form part of a freight car body. He therefore refers to "Freight-car Bodies" in the index, and finds that they are represented in figs. 55-57. In looking over these, he will be seen that the timbers referred to are represented in the plan, fig. 55, and the end view, fig. 56, and are numbered 4. The running line on top reads, "See list of names of the parts represented by the numbers in the engravings, see page 110." Turning to 110, he will learn that the name given to this part, numbered 4 is "Center Floor Timbers." If he wants the name of the piece of metal which rests on top of the journal of an axle and resists its wear, he finds "Axles, Journal-boxes, etc." and refers to figs. 138 to 143. In figures 138 and 140 the part he is looking for is numbered 1, and in the list on page 178 its name is given as "Journal-bearing." If the name of the attachment reader will know that it belongs to the class designated "Window-furnishings," in the following index. By looking over the engravings representing this class of objects, figs. 208 and 209, which represent this attachment, would soon be found with its name "Window-furnishing," in the title below. The several parts of a window latch are also numbered in

the engravings, but as there are so few of them, the list is given under the engraving.

"Terms can also be found, if the general word under which it is classed is known, by referring to the latter in the alphabetical list. Thus, to find the name of the bearing which supports a car-body on each side of the king-bolt of a truck, look under "Bearing," and in the list will be found "Truck Side-bearing." In a similar way other terms may often be found by these references.

"It must be remembered, though, that this book does not contain all the terms used by car-builders to designate the parts of cars. If it did, it would be many times its present size. All that was aimed at, in compiling it, was to assign appropriate names to the appliances and to the parts of cars in common use.

"In conclusion, the committee will repeat what they said in their report of 1878, which was that "if when this work was commenced the committee could have formed any idea of its magnitude, they certainly would never have undertaken it." Their chief pleasure now is in asking to be discharged.

L. GAREY, }  
M. N. FORNEY, } Committee.  
C. A. SMITH, }

Mr. Forney, for the *Railroad Gazette*, which publishes the work, then paid over the sum of \$903.41 to the Treasurer of the Association, as royalty in accordance with the original agreement.

Dr. DENNETT—I must think that a vote of thanks be tendered to this committee and that they be discharged.

Mr. FORNEY—This committee wish to make a report on behalf of the *Railroad Gazette*. When the proposition was made for its publication in this book, the following letter was submitted, which will be found in the report for 1878:

NEW YORK, June 10, 1878.

To the Members of the Master Car-Builders' Association:

GENTLEMEN: The proprietors of the *Railroad Gazette* will publish the Dictionary of Terms, relating to railroad cars, which has been prepared by your committee, apportioned for that purpose on the following conditions: In consideration of having the exclusive right of publishing the Dictionary, and the privilege of inserting advertisements in the back end of it on pages of a different color from those on which the text and engravings of the dictionary itself will be printed, they will bear the entire cost hereafter incurred for drawings, engravings, composition, printing, and, in short, the entire future expense of the publication and sale of the book of the form of the blank herewith submitted; they will furnish each member of your Association, who, at the date of its issue, has paid all his dues to the Association, a copy free, and sell the book to all other parties at a price not exceeding \$1.75 per copy, and pay no commission to the Master Car-Builders' Association, a royalty on all the books sold during the year equal to ten per cent. of its retail price, until the amount thus paid shall amount to \$903.41, or the sum which the Association has up to this time expended on it, after which no further royalty shall be paid. Respectfully,

N. FORNEY,  
S. WRIGHT DENNETT.

My object in reading this is to call the attention of the Association to the terms on which this publication was undertaken, and I wish to say that I am instructed by the proprietors of the *Railroad Gazette* to hand over to the Association the full amount which it was agreed to pay, \$963.41, which I shall have the pleasure of handing to the Treasurer.

Mr. J. H. RAYMOND, Western Railroad Association—This Association and the *Railroad Gazette* are now under an agreement that this book shall be sold at \$1.75 per copy. I move that the price be now fixed at \$2.

Mr. FORNEY—By the arrangement originally made the price was fixed at \$1.75, but the expense of preparing the Dictionary for publication was so great that it was found extremely difficult to make profitable arrangements for the sale of the book. I suppose the members know that the discount which must be given to any person who sells a book is very heavy, and the margin in the case of this book was not large enough to allow of a discount. I therefore ask the consent of the other members of the committee to fixing the price at \$2. If the Association thinks that the price should be \$1.75 we will, of course, sell the book at that price; but if you think that our demand is reasonable, we would ask you to fix the price at \$2.

This and the motion of Mr. Davenport were agreed to.

Mr. FORNEY—I do not wish to make use of this Association for the purpose of advertising, but I would like to say that I have brought with me a small supply of these books, and I can furnish copies to those who desire them. Those members who have paid up to the Association their dues, will receive the Dictionary will of course be supplied free on applying to the Secretary.

Mr. FORD, the Vice-President of the Association, being absent, it was agreed that Mr. McWood should act as Vice-President.

A communication was received from Mr. T. A. Bissell, Manager of the Pullman Car Works, in

Detroit, inviting the Association to visit the works, which invitation was accepted.

#### FREIGHT TRAIN BRAKES.

Mr. C. E. Garey, from the Committee on this subject, presented the following report:

To the Master Car-Builders' Association:

GENTLEMEN: Your committee on freight train brakes would submit the following report:

At the meeting of the Association in June, 1877, the first device designed to be an automatic brake, independent of all special connections between the cars, was presented. Since that time there are no less than twenty-two inventors of freight-train brakes with whom your committee have had correspondence, while there are still others known to members of the Association. Of this number eight have not favored us with either tracings or models of these, five claim that their brakes act independently on each car. Of the remainder, two operate from either end of the train, six require a continuous connection of the brakes, and six act independently on any car to which they are attached. Thus showing that one half of these twenty-two inventors are designed to fit the requirements set forth by your committee in their first report.

These inventors are widely distributed over the country, from the Atlantic Ocean to the Rocky Mountains, and from Canada to the Gulf. So it appears that this subject is receiving the attention—from inventors at least—that its magnitude demands.

All the practical advantages of the devices that were expected during the past year, owing to various causes, have not been made, although something has been done, and preparations are in progress which it is hoped will assist in perfecting a reliable automatic freight-train brake applicable and operative on any car equipped with it, without regard to its location or the presence of other cars not so equipped in the same train. And, judging from the developments of the past two years, we are satisfied that the competing railroads of this country will continue with such a device, and will not wait for the wisdom of future ages, as your committee is confirmed in its previously expressed opinion that the inventive genius of this country is capable of coping with any subject that is presented in a concise and practical manner.

All of which is respectfully submitted.  
C. E. GAREY, }  
G. HACKETT, } Committee.  
L. GAREY, }

Mr. C. E. GAREY, of the committee, called attention to a resolution adopted at the last annual meeting, appointing a committee to take steps for testing such brakes as may be deemed worthy, and to confer and co-operate with the Western Railroad Association in the making such tests. That Association, however, having rescinded their proposition, there was consequently no occasion for the committee.

On motion of Mr. Aylesbury, the Committee on Freight Train Brakes was continued for one year. Mr. ORTON—I would ask if the committee are prepared to recommend any particular device as suitable for general adoption.

Mr. RAYMOND—I am perfectly sure that the committee are not able to answer Mr. Orton's question. I would ask them whether they are ready to recommend any of those brakes as being worthy of experimentation, which they have not made?

Mr. C. E. GAREY—I would say that there are now in progress experiments for testing those devices, and that until the tests are completed we are not able to make any further report than we have done. There was a trial made of the Tallman brake on the Pennsylvania Railroad, near Altoona. Your committee were not able to attend the trial, but it is reported that some very good stops were made. I understand, from the inventor, that the brake was placed upon five cars which were empty. There were five other empty cars on the same train unequipped with the brakes. The train was run 33 miles an hour, and a stop was made in a little over 300 feet. On the second day, a train of 12 cars, five loaded with 15 tons each of coal, and one passenger car and five empty freight cars, four equipped with the brake, on the same grade, running 19½ miles. Two stops were made in less than 650 feet. I understand that more cars are to be fitted up with that brake on that road, and that more tests are to be made with it. That is the only regular test that I am aware of during the past year. Other bodies are applying for an annual test and it is hoped that they will help work out this problem.

Mr. AYLESBURY—I understand that there is already, not an automatic, but a power brake in use on a connection train on the Grand Trunk road. Dr. Smith, I believe, is the inventor. I was thinking that perhaps Mr. McWood could give us some information in regard to that.

Mr. McWood cannot say that so far as that is concerned, the test is not in such an advanced stage that I can form any opinion whatever as to its merits or demerits.



Mr. C. E. GAREY—A paper has just been handed me showing a test that was taken yesterday.

At a special freight train was taken to Cochran, Ind., and returned this afternoon, on the Ohio & Mississippi road, to make a test before a number of railroad men of a new automatic brake, specially designed for freight cars. A series of tests by different kinds of stoppages were made, and were satisfactory. Representatives of nearly all the railroads witnessed the tests.

So it appears the country is alive to this subject of freight-train brakes, and as this country is not much given to going back on its past record, we may expect something more in the future. I apprehend that there are some gentlemen here who have made some trials of train brakes during the last year. I would like to hear from Mr. Blackall what his experience has been.

Mr. BLACKALL—I would say with regard to that particular brake, that the trial we made was very satisfactory. Some changes in the construction have since been made, and I understand that later trials have been made on the Old Colony and other roads near Boston. The trial made at that time was quite satisfactory. I noticed a cut of the brake in the NATIONAL CAR-BUILDER for June.

The PRESIDENT—At our last meeting a committee was appointed to make tests of the wearing qualities of brake shoes. I think that subject would come in very properly at this time, in connection with train brakes.

Mr. C. E. GAREY—I would like to ask if any member of the Association is acquainted with the operation of the Car automatic brake.

Mr. COULTER—That brake has been tried on the Ohio & Mississippi road. It was put on fifteen cars and made one trip over the road. I had only a minute to look at it, just while the train stood there on the side track, and I am not prepared to say anything that would interest the Association. I hope that at the next convention I shall be able to say something definite in regard to it.

Mr. GOODMAN—That brake is a brake operated by centrifugal force similar to the governors on an engine. The speed of the train will set the governor up to its proper position, so that it will throw a rod into a position to attach itself to a pin on the draw-head, so that whenever the speed of the train exceeds 7 miles an hour this rod will be in position to hook upon the draw-head and catch the brake. As long as it remains there, and the speed of the train continues until a pressure comes on the draw-bar, it will not operate; but as soon as the pressure comes upon the draw-bar backward, this brake will take hold. The device is simple and costs very little. We can put them on, probably, for \$10 a car. It made a stop on the railroad between Belleville and East St. Louis on a 100-foot grade in a little over 500 feet, but that was done by the application of the brake on the engine, and the reversing of the engine itself. Several stops were made, which were all satisfactory. It operates on each car independently.

The PRESIDENT—Have any tests been made of the wearing properties of different materials for brake shoes?

Mr. ORTTON—If I mistake not, Mr. Hayes, of the Illinois Central, promised to provide us this year with the results of a series of tests on the different qualities of material. He was going to try cast iron, wrought iron and Congdon shoes. I think, as he is not here, it might be as well to let that question lie over. I presented a report last year which is in our annual book, and the tests as I made them, given in that report, showed that the cast iron had an abrasive quality very much superior to the others. I have not had an opportunity of repeating the experiments. In fact, I did not think it was necessary to do so, and especially as Mr. Hayes made a promise that he would undertake them. As you recommended that all the members should make themselves acquainted with the qualities of these metals, I did hope that some of the members would have tried experiments.

Mr. RAYMOND—Before this matter of train brakes is left I want to say a word. At the last annual meeting of this Association there was a very interesting discussion as to the methods pursued by the committee on train brakes. I believe it was then determined, in order to accomplish any results worthy the ability of the members of the committee, they should do either one of two things: They should take up these brakes, examine them from drawings or models as experts in the business, and report to us on them; or else on the other hand, which was preferred, to make experiments.

Mr. HOPKINS—While agreeing with Mr. Raymond in the importance of pushing this work, I apprehend that to some extent at least the difficulties of the committee are not fully understood. In the first place, they started from nothing; and

when we consider the vast magnitude of railway interests, we can well understand that they had nothing to start from. They had to determine what they wanted, and then ask the inventors of the country to aim at the target set up by them. Since the time that committee was appointed, the very numerous efforts made by inventors, which I believe were in nearly all cases pretty crude, indicate that their work has been productive of very remarkable results. They have succeeded in producing train brakes that really have very marked efficiency. As to the committee being obliged to test these things, I, as one who has given some attention to the subject, know that until the last two or three years it has been impossible to get permission from the railway companies to test brakes. I know of a case where a man offered to pay for the use of the cars during the time that they should be detained in applying the brakes; then during the time the car should have the brakes on, and while the tests were making, he would pay for the use of the cars and take the brakes off at his own expense. Under these circumstances, it seems to me that the inventors and the committee have had great difficulties to contend with; and that their progress must be slow seems to me to be one of the necessities of the case. Now, the results which we see of trials all over the country prove that their work has been thoroughly efficient, and as one of the committee has been very ill during the past year, it seems we can hardly do better than leave them to deal with the subject as they deem best.

Mr. RAYMOND—I do not want to be understood as casting any reflection whatever upon this committee. The character of their work and the difficulty of obtaining any definite results, are too apparent to be questioned. They do not merit any disparagement. At the time of the last meeting of this Association the Western Railroad Association had a *modus operandi* for making these tests, and as the committee did not communicate with us the matter fell through. I do not myself see how these tests can be made in the way that they ought to be made. I have been present at some of these tests, but did not examine the methods, and consequently can make no intelligent report of them. The most important part of an experiment is the planning of it, and next the skill in conducting it and noting results. I think the committee should be increased to seven or nine, and that each member be charged with the investigation of a particular brake, and present his report to the chairman—such reports to be printed, so they can be studied and discussed intelligently next year. There are now some 45 or 50 devices presented by inventors, each embodying the conditions required, and these should be examined and the results laid before us.

Mr. HOPKINS—In the matter of these brakes, I am not aware that there is one inventor on the land who is prepared to say to-day that he has got something that is an unmistakable success. Their trials have been incomplete. Where they have made their trials they have been but partial trials; and it seems to me that in a matter of such vast magnitude, we will do best by making haste slowly. Inasmuch as the committee cannot invent, they can only wait until the inventors have brought out something which is a complete fulfillment of the requirements which have been set forth.

A MEMBER—I think, Mr. President, it would be proper to increase this committee by adding two or three more gentlemen to it.

Mr. HOPKINS—There is one point to which I would like to call your attention. That is the difficulties that arise from making our committees cumbersome by getting too big. The difficulties which have been encountered in dealing with the Master Car-Builders' Dictionary of Terms have most thoroughly illustrated the importance of having committees small enough so that they can be got together.

Mr. RAYMOND put his suggestion in the form of resolution.

Resolved, That the thanks of the convention be, and they are hereby tendered to the Committee on Train Brakes for their arduous work and for the rapid progress which has been made in this field of invention, which, in my opinion, very largely due to the efforts of this committee.

2. That the committee shall appoint in its discretion, out of members of this Association, such additional members to serve on such committees as they may desire, and as soon as practicable, delegate each of its own members to examine and report on one or more of the recent inventions in train brakes, which reports of the individual members of that committee shall be printed and placed in the hands of the Secretary of the Association on or before the first day of the next annual meeting; and that each member of this Association will call the attention of the Chairman of said Committee to

each and every train brake which may come to his attention, and so far as possible will cause the committee to be furnished with drawings and models thereof.

Adopted.

Mr. C. E. GAREY—I will say that there has not been a solitary inventor of train-brakes who has represented to this committee that he would wish to have his invention tested by the Western Railroad Association. Furthermore, we did not have any idea that that Association was going to nullify this arrangement after the 1st of January. We presumed that we had the whole year in which to work the thing up. When this committee was appointed there was not such a thing in existence as a freight-train brake, to my knowledge; that is, the kind of brake required to do the work. Now, sir, since this committee was appointed, this subject has been agitated, and now, as the gentlemen tell us, there are 45 or 50 inventions that are worthy of being examined. How are those inventions to be examined unless they are presented to some one. I have made application to more than 20 of these parties for models or drawings of their inventions. Nearly half of them have not complied with that request. How the committee can go to work and make a report on something that has no existence in fact, or make a report until the thing is tested is beyond my comprehension. I am happy to say that our railroad companies are apparently waking up to the idea that it is necessary to make some tests in order to find out whether there is anything in the inventions or not. I have no objection to this committee being composed of men who I have no objection to being relieved from this committee. I am willing to do what I can to work the thing out, but I want it distinctly understood that it is not the fault of the committee that they did not present something that was not presented to them.

Mr. ORTTON—The remarks brought out this morning seem to prove the truth of the old adage that large bodies move slowly; but I think there is something looming on the horizon, and I hope that something valuable is coming out of it. I hope that during the ensuing year the committee will continue their investigations, and that inventors will submit their inventions to the committee in such a way that some action may be taken with regard to them. I have got two or three descriptions of inventions sent to me which I cannot understand. They are not written by mechanics, nor are the drawings made by persons who understand mechanical drawing. I do not think that the subject of train-brakes has been sufficiently long before the country to enable us to decide on the subject in a very summary way. When we have been so many years in getting a standard for bolts and nuts, and a standard axle, I think we could wait a year or more for the results of the investigations of the committee on the subject of a new train-brake. I have seen some of them, and they are not reliable, but still there are difficulties in the way with regard to them, and I think we should not be in too great a hurry with the committee. I think that the committee deserve some encouragement for what they have done. I do not understand that Mr. Raymond casts any reflection on them. I think that his idea is that the investigations and the experiments should be thrown into the hands of the Western Railroad Association, and I am not prepared to say that that plan would not be the best. In order that there might be some tendency to push things along quickly, it would perhaps be better for an independent association of that kind to take hold of the matter, than for us who are so occupied that we cannot arrange to get together for such a purpose. If the Western Railroad Association, or any other association of that kind, were empowered to take action, they might perhaps arrange for this and deal with the subject in a better way.

Mr. DAVENPORT—I think we are all aiming at the one thing in this matter. Perhaps we are a little rapid, as Americans are apt to be. We need to think that in 1876 such a thing as a train-brake for freight cars was pronounced utterly impracticable; the idea was scouted. And when somebody suggested that if train-brake was possible for passenger cars, a train-brake was possible and desirable for freight cars, it was ridiculed. You remember the first discussion, brethren—now, who were present—and we are told to-day that there are 45 inventions which are worthy of consideration, in this line. Now, I want to know if that is not stirring the matter up pretty lively? Here is a committee that have, to my knowledge, what if that matter, but I think they need something which they have not yet had. I think that it is the duty of any member of this Association to whom is brought any invention in this line, which, upon



examination, he considers worthy of experiment, to communicate at once to the chairman of this committee, bringing the matter to the attention of, and placing him in communication with the inventor. In this way this committee will be favored with all the light that is possible, and I am persuaded that a year hence we shall have this matter in a tangible form. Very few roads now would like to run a passenger train without a train-brake. Ten years hence very few roads will venture to run a freight train that is not within the control of the engineer. True, they say that an American would take one chance in fifty of getting to his destination 20 miles an hour faster—that is, if he knew 49 men were to be destroyed, and one saved, he would take his chance in preference to traveling by slower means.

The progress that has been made in this matter of train-brakes has been to me very gratifying. I believe I had the honor of standing up and fighting for this thing in the first place, and I hope my life may be spared long enough to see the freight trains of this country equipped with automatic train-brakes in the hands of the engineer.

Mr. HOPKINS—In laying down the conditions that must be fulfilled and complied with in the first place, the action of the committee might be said to have been a little unpropitious in its character, since they had nothing to guide them; nobody else believed it possible; they did believe it possible. They formulated the conditions to be fulfilled and complied with, and, as Mr. Raymond says, more than forty inventors have sprung up now within four years who aim at that target which this committee set up before them. Now this committee are pre-eminently qualified to go on and discharge the duties, that so far I think they have discharged most faithfully. It seems to me that if we were to do anything to incumber this committee, intelligent as they now are on the subject, that we will be doing evil to the Association and the interests of the country, and that we should be careful how we throw into this committee any crude elements. They have become to a certain degree experienced in their particular line.

Mr. HILDRUP—Inventions originate in the minds of men oftentimes in a very crude form, frequently the same thing in different individuals. Many are brought into use, while many are worthless. Some are brought into use under favorable circumstances, and ultimately are a success. But time is the great element in the development of all these things, and we make probably more progress in the matter of time than any other people on the face of the earth. If the committee be charged with the duty proposed, they will have a great deal of labor. Shall they meet together at some railroad shop and put to a practical test all the various designs and inventions presented? That, you will see at once, they cannot do. They cannot get a railroad which considers this subject of sufficient importance to justify the expense of making tests. They are not able to do it themselves. They are all men who are fully occupied already; but we have put the ball in motion that will produce the result. When an automatic train-brake for freight-cars was announced as an important requisite in railway machinery it was not believed to be practicable. See the progress that has been made in four years. Now, who is going to develop these inventions? They are private property, the property of the individuals who originated them. If they have an effort, and there was a measure of success, this committee can get together and present such successes as are made, and we thus get a knowledge of them. I think that if we charged that committee with such a duty as was suggested, we would give them too much of a load. If it is a want it will be met, and we all acknowledge it to be a want.

Mr. RAYMOND—I most heartily believe in two things: First, that there is no class of men in this country to-day who labor under such difficulties as inventors. The obstacles in their way are wicked in the extreme. Without understanding why, it is also a fact, and this is not chargeable in any sense to the railroad men. We cannot help it that there are 176,000 patents alive to-day, and that out of that number 150,000 are not worth the paper they are printed on. The other proposition that I also heartily believe in is, that it is the duty of

every railroad man to consider how we can remove these difficulties. It is as much to our interest as it is the interest of the inventors, that we should get their good inventions into use. The science of railroad engineering is not bound by the ability to go below another man in cutting rates, or in doing other things of that character. But questions of that sort do and have occupied the time and ability of our ablest railroad managers. The true science of railroad engineering is represented in this room, and in the rooms of the master mechanics, and it is upon you, gentlemen, that the chief responsibility rests in this matter. It takes an inventor from 5 to 15 years to get a good meritorious invention into use. Why is that so, and how can we prevent it? It is just as much to our interest to answer that question as it is to the interest of the inventor. In the past we have had to reduce our rates both for freight and passengers gradually yet continually.

The law which governs in that respect is above the statute law and the granges. It is the law of public opinion which controls everything in this country, and the railroads more than anything else. That gradual reduction in rates which has surprised everybody must continue in the same way. We have got to be content to have got to provide for it, and we can do so in no other way in the world than by improvement in the devices which will aid economy, speed and comfort. That is the biggest problem in railroad to-day. These are the questions that should shake the railroad world to its center. The Master Mechanics' and Car-Builders' Associations have not hitherto had the confidence and co-operation of the railroad managers of the country. Why is this? I leave it for you to answer. You have no question before you which is of as much importance as that. Why is it that when you come to so small a matter as the size of a piece of mechanism that only a majority of the members abide by your decision—a decision which is in too by the Master Mechanics? The committees have not done honest, intelligent work that would bring forth good results. I have not said a word that can be interpreted as a criticism on the committee or on train-brakes. They do not deserve it. The monument of the committee is the setting forth of the conditions to be made and complied with. But the matter stands to-day as it was when the committee began its work. If the committee were to go over those conditions to-day they would change and add to them. If a member of that committee was required by his manager to send up a report on train brakes, he would not send up such a report as that. What do we know to-day, save a few glittering generalities, that we did not know yesterday? What is the function of this Association? What do we want of committees? The minute that we say that this is the best coupler or the best brake in the country, that minute will this Association go to pieces. Nothing is surer than that, although I have been roughly abused for saying the same thing last year. This Association will never amount to anything if it allows its committees to come in every year with glittering generalities. We want this committee to be able to say that they have taken and examined the records of the Patent Office, and find that there are 45 improvements of train brakes. Out of those 45, Mr. So-and-So takes his power from the engine, Mr. So-and-So takes his from the axle, and so on. If they reported in that way, there is not a member of this Association who could not take any one of those brakes and make an intelligent report on it. The Western Railroad Association can have nothing to do with this. That is out of the question. I got set down on by my own Association in this matter, I believe it is out of the question for this committee to make any experiments this year. Some of its members may do so on their own roads, perhaps. Let the members of the committee who do not make experiments, take up these respective devices, and make a *prima facie* report to us of what they are. The members of the Association will then go home and study them, and each will then take the one that he thinks has the elements of success in it, and he will go to work on it. I do not want to criticize the past any more, but I do want something done that will produce some tranquil results in the future.

Mr. HOPKINS—I would suggest that it be left to this committee to determine the number of new members by which the committee shall be increased.

Mr. RAYMOND—I accept the amendment.

The resolution was agreed to.

Mr. RAYMOND—The question of uniformity and

of standards is a question of far greater importance to-day than the question of continuous train brakes. We are agreed as to the screw-threads and journals, and three or four other things. But if any one of them was adopted to-day, it would be worth, I would not pretend to say how many hundred thousand dollars, I would simply suggest that we appoint a committee who shall ask the Supervisory Committee of the Master Mechanics' Association to meet them and to do something to get an order issued from the Trunk Line pool for the adoption of those standards. If you get it from that pool it means law. The question is how to carry into effect the results we have already obtained as to standards, and get them adopted.

Mr. HOPKINS—I sincerely wish that our managers were disposed to give a little more latitude, a little more liberty of action, to their master car-builders and master mechanics in regard to making tests, holding them responsible for results, but not holding them responsible for results and restricting them as to means by which to reach them.

Mr. C. E. GAREY—I would like to ask for information, when this committee on train-brakes shall have selected certain gentlemen, members of this Association, co-operate with them in their work, carrying out the idea of the resolution which has been passed, whether it will be obligatory upon the gentlemen so appointed by this committee to serve, or whether this committee is relieved from further efforts when it has requested a committee.

Mr. RAYMOND—I can only make the suggestion as to what I would do if I were chairman of this committee. If I appointed Mr. Roe on that committee and told him to go to work on the Card Brake, and he refused to do so, it should relieve him and appoint a new member, and report him at the next meeting of the Association.

Mr. C. A. SMITH—I am not sorry this discussion has come up. I really think it is going to do some good. Our members heretofore have been idle in making investigations, and I am not sorry Mr. Raymond has brought it up, although I think he is a little unjust on this committee. The subject of train brakes was a myth; it was not in existence. We will get something tangible now.

Mr. RAYMOND—I most heartily support that part of the resolution which gives thanks to this Committee.

Mr. C. E. GAREY—Right here I would like to make a request to the members of the Association, that any information they have in their possession as to any devices for train brakes which, in their judgment, is worthy of any further consideration, that they advise this committee that offer advice to that effect.

On motion of Mr. Orton, the Committee was continued another year.

#### IRON AND STEEL IN CAR CONSTRUCTION.

Mr. Davenport, from the Committee on this subject, presented the following report:

Mr. President and Gentlemen of the Convention: Your committee on "The Substitution of Iron for Wood and Steel for Iron in Car Construction" beg leave to report that the past year had not witnessed that progress in the line of substitution of iron for wood in the building of cars that was expected. A sufficient reason for this is found in the enormous advance in the price of iron, familiarly known as the "iron boom." We do not intend to discuss this tender subject any more than is absolutely necessary. It has passed into history and will be associated in our memories with that list of wild speculations which might properly be labeled "South Sea bubbles" and pigeon-holed for future reference. We do not view this in any other light than a temporary check. Modern improvements are steadily and certainly reducing the cost of iron and improving its qualities, while on the other hand timber is being used up much faster than it grows, and because the best is selected and cut first, the quality is yearly becoming poorer on the whole, and sooner or later will drive us into this substitution, whether we desire it or not. Then why not accept the situation and make the change gracefully?

Iron body bolsters seem to be working their way into favor steadily. The natural tendency when substituting iron for wood is to make the iron needlessly heavy. We must bear in mind that wrought iron is more than thirteen times stronger than the best white oak when green, and the difference increases as the oak dries and grows weaker, while the strength of the iron remains for all practical purposes unchanged. The great strength in proportion to position to resist the severest strains. By figuring up the working strength of iron body bolsters in ordinary use you will find them capable of carrying over one hundred tons of load per pair. As the cars are calculated to carry but 15 or 20 tons of load each, what excuse have we for wasting so much iron? While iron is over 13 times stronger than green oak it is less than seven times heavier according to bulk, therefore a properly proportioned iron body bolster should weigh but about one-half as much as a green oak bolster of equal strength. But what is the fact? Our iron bolsters are the heaviest. No wonder our general



managers object to the greatly increased expense and useless dead weight of our bolsters.

Iron trucks in all imaginable shapes and forms, patented and unpatented, are brought before us in bewildering array. We listen with great attention to the particular excellencies of the one being shown us and are almost persuaded that it is the perfect truck and must be universally adopted, when, coming another good talker, who mildly suggests so many weak points in the other man's truck and so many good points in his that we are disgusted with ourselves, turn our back upon number 1, and are charmed with number 2 until number 3 is explained, and that eclipse both the others, and so on to the end of the chapter. The amount of inventive genius at work on iron trucks shows the felt want of a more durable truck than has yet been produced. That the truck of the future is to be almost wholly of iron and steel, few doubt. The arrangement and proportioning of the parts so as to secure the greatest strength with the least possible weight and at moderate cost, and so planned as to be readily repaired, is the problem. Don't be frightened, gentlemen; the committee has no patent iron truck in its pocket which is to be sprung upon you for adoption. We only wish to turn your inventive genius toward the production of an iron truck with the above-mentioned good qualities.

But little has been done in this country toward producing and bringing into use an iron or steel car frame. In Europe, where timber is more expensive than here, they claim to have reached a demonstration that iron is better, cheaper and lighter than wood for the bed of a car. There they proceed upon this theory in cars: As all the blows in railway traffic are received and delivered and the weight carried on the bed of the car, there all the strength to resist blows and carry load should be placed. There, they make sills, side floor timbers of iron, well braced and calculated to carry all the load, depending not at all upon the trussing of the sides for strength to help carry the load. They rivet the sides, ends and roofs as awnings, or tarpaulins, to cover the goods in the cars, and consequently make them as light as possible. In fact, they often carry such freight as we load in box cars on platform or flat cars, covering it with canvas to keep it dry.

In this country such practice would not answer, yet we may learn something from them in the use of iron in place of wood in car beds. As we are compelled to have substantial covering for our cars, we wisely utilize the trussed sides to support the load. In this country where iron sills and floor timbers have been tried, we are informed that their durability is perfectly satisfactory, the only complaint being the difficulty in repairing, owing to the faulty style of construction. Over twenty years ago a number of iron box cars were put in service on the New York Central Railway. We hope to hear a report of their performance from the representatives of that road present here to-day. Judging from the examinations made, your committee expects a favorable report as to the iron car bed, but adverse as to the sheet iron sides. Both here and in Europe they are condemned on account of deterioration by rust. If some inventive genius will devise a coating for sheet iron which will protect it from rust, the chief obstacle to the introduction of iron cars will be removed.

Regarding the substitution of steel for iron in car construction, almost nothing has been done. One trouble is that manufacturers do not expect a high price for their products, and thus prevent its use where otherwise it might be profitably substituted. That this is short-sighted policy none can doubt. It is claimed by some who pretend to know, that Bessemer steel can be produced to-day cheaper than iron. If this is true, there will be a break in price before long, and mild grades of steel will displace iron for many uses.

W. R. DAVENPORT, Committee.

JOHN KIDBY.

Mr. COULTER would like to ask Mr. Davenport what sized iron would, in his opinion, be sufficient to put under a 16-ton car.

Mr. DAVENPORT—There are conditions that enter into that. Of course, you might say that  $\frac{1}{2} \times 8$  inches would be heavy enough in certain conditions; in others it would not. There are now, as you know, body-bolsters put in that are an inch in thickness and 6 inches in width. They are supported by an end cross, which is supported by bolts and space pieces welded up at the ends and bolted, and what one of those will carry is something tremendous. The size will depend upon the height of your arch and the number of your space pieces. The best way to do that is the way in which Mr. Wilder has been doing it. He calls in a man and requires him to figure up just the strength of the material as he progresses with his plan, and he decides upon what is sufficient. When we come to iron, the tendency is on the side of getting it too heavy. The thinner you roll your iron, other things being equal, the better you get it. The thicker it is, the heavier you get to muck.

Mr. Orton opened our eyes to this last year, and this committee considered it in making their report. We are persuaded that we are in the right line for this substitution, but we should be careful and figure what we want to carry. If we are going to carry 100 tons, then, by all means, give us the iron to do it. But if we are going to carry 30 tons, we do not want to put in iron for 100 tons.

Mr. ORTON—do not think that it is for a lack of interest in the question of substituting iron for wood, and steel for iron, that causes members to

be backward in speaking on the subject; but I think as Mr. Davenport says, the bolsters in iron has prevented the carrying out of experiments, in connection with iron, this year. This iron question is one of the ponderous bodies that move slowly, and I think we had better let it rest the way it is for the present. We have seen a good many cars this year equipped with the iron bolster, and so far as I have noticed I think they are going on satisfactorily. The next substitution is iron sides, instead of wooden transoms, in the trucks. I think if we allow the committee to continue their investigations as proposed, it will be the best way of dealing with the matter at present. One word more with respect to the iron transoms of trucks. I wish all the wooden ones were out of existence. I think that wooden transoms of trucks are an abomination.

Mr. GARREY—I am in favor of the iron truck, hard while you are making an iron truck I would like you all to bear in mind some of the short curves we have on many of our roads. I noticed that the Canada Southern was a very straight road, and the iron truck might do very well there; but there are other roads with many short curves on which, if you want to keep your brakes on your wheels, an iron truck would not work very well.

Mr. ORTON—I was afraid that Mr. Garrey was going to say that as the curves were short, it was necessary to have the brakes hung to the trucks. I think the brakes could be better hung on an iron truck than on a wooden one.

Mr. FORNEY—I don't know that any better opportunity will present itself of offering a resolution, the occasion for which I will explain. I suppose all the members present know that some years ago there was a lithograph prepared of the standard bearing, journal-box and pedestal, and that that lithograph has been circulated pretty generally among the car-builders of the country. Some months ago, in examining that lithograph I found it was a little indistinct in representing the journal bearing, and it occurred to me that it would be desirable to prepare an engraving of the journal-bearing and publish it for the use of car-builders. In order to be quite certain that that engraving should be correct I requested our worthy chairman to furnish me with a duplicate copy of the original pattern from which the lithograph was made. I procured that duplicate, and then undertook to compare that with the lithograph, and from the two to make a drawing. On examining and comparing the two, I find that there were quite a number of minor discrepancies, and, on examining that lithograph with some care, I also found what appeared to me to be very gross discrepancies. Since then I have been informed by a number of car-builders that, in taking the journal-bearing from the standard box on one road, and attempting to put it into the standard box of another road, they found it impossible to get one into the other. There is evidently considerable confusion regarding that matter. Therefore, at the last meeting of the master mechanics, I moved that a committee be appointed to consider if any change was desirable, and to confer with this Association. Of course, it is unfortunate that the facts exist as they are; but, from the attention which I have given to it, there evidently is some confusion, and the sooner we find out what is wrong, the better it will be for all concerned.

Mr. DAVENPORT—I second that motion, Mr. President, with regard to the oil-box known as the Master Car-Builders' standard—the adoption of the  $3\frac{1}{4} \times 7$  inch journal—that was the main thing. Attention was lavished on that. Attention to the details was not such as it should have been. The gentlemen most active in getting it up admit that, and I think they are as earnestly in favor of correcting the details as anybody; and now I would suggest to the consideration of this committee what I should like to appoint. As I think it will be, that the Master Car-Builders' journal does not involve the peculiar oil-box cover which is in use, and which is so far behind the times that nobody but I know of wants to fabricate, and the liner—I don't know but I am getting on pretty dangerous ground now if I should say anything about the brass—but I think that our President is so good-natured that I can say that the liner and brass could be improved materially, so as to economize the material that is put in. There are a great many better brasses and liners in use, as we all know; and as to the oil-box cover—now I haven't any ground to stand on in this matter—but I would suggest that the Lake Shore and Cleveland & Columbus, and some other roads that I know of, have adopted a malleable cover with an inside spring, which is so constructed that, as I use, if we are going to have a cover that opens that way, I don't know of anything better.

Mr. FORNEY—I would like to ask Mr. Davenport if it is patented?

Mr. DAVENPORT—It is not patented, so that there is not going to be any expense connected with it. Malleable iron won't pay; there is no market value for it that I know of. I tried to sell some once and the man laughed at me.

Mr. HOPKINS—If I understand the resolution correctly, it empowers the committee to go into the subject of journal bearings and boxes.

Mr. FORNEY—It does not give them any power, except to report.

Mr. SMITH—I would suggest that if we appoint a committee, we should not wait another year. And if there are any alterations, I think the committee should be empowered to make the alterations. I would recommend, as I have done before, that the Association have a new drawing made of every part. Then a man knows just what he has got, and he cannot make a mistake.

Mr. HOPKINS—I would like to suggest again, so far as this committee's putting any modifications into use is concerned, the propriety of making haste slowly. While I think it would be well for them to test any modifications that appear to them desirable, I hardly think they would feel willing to have the adoption of such modifications rest solely on themselves. I think they would naturally prefer that they should come before the Association for final adoption or rejection.

Mr. SMITH—I did not understand from Mr. Forney, talking the matter over with him yesterday, that there was to be any radical change that would interfere with, or that would hinder the committee from, putting them into operation. To postpone it another year I do not think would be advisable. I think it would be best, to deal with matter at once.

Mr. HOPKINS—I feel the necessity of excusing myself for taking up so much of the time of the Association, but it appears to me worth while for this Association to consider fully the suggestion made by Mr. Davenport, that there might be important modifications. When the master car-builders adopted their box and slide they had to start from perfect chaos, and to do the best they could, and that in the course of time improvements of a substantial character will be made seems to me highly probable; and I think it worth the while of this committee to fully consider not only minor changes, but major changes, and whether or not they are desirable.

Mr. FORNEY—I have written this resolution. It is as follows:

*Resolved*, That a committee of three be appointed to confer with a similar committee of the Master Mechanics' Association to investigate the present standards of what are known as the Master Car-Builders' standard journal bearing, journal-box and pedestal, and that that committee report whether any changes from the present standards are desirable.

The resolution was agreed to.

THREASURY'S REPORT.

Mr. B. K. Verbyck, Treasurer of the Association, submitted his report for the past year as follows:

	RECEIPTS.	
Balance on hand last report .....	\$32.40	
Dues from 65 members .....	\$30.00	
Total .....	\$362.40	

	EXPENSES.	
Reporting 13th Annual Meeting .....	\$115.00	
Printing .....	194.00	
Postal cards stamps and stationery .....	38.75	
Axis cuts .....	7.00	
Lithing file .....	1.00	
Printing circulars, etc. ....	11.00	
	\$358.75	

Balance on hand this date .....

June 8, 1880. R. K. VERBYCK, Treas.

REPORT ON ASSOCIATION ROOMS, NEW YORK.

The Secretary submitted the following report:

	RECEIPTS.	
Balance on hand last report .....	46.10	
Received from advertisers .....	635.00	
Received from rents .....	207.00	
Total receipts .....	\$1,248.10	

	EXPENSES.	
Rent of rooms .....	\$900.00	
Salary of janitor .....	240.00	
Reporting meetings .....	100.00	
Postal cards, stamps and stationery .....	35.52	
Carpet and mats .....	57.51	
Fuel and gas .....	20.00	
Repairs of rooms .....	23.00	
Blank books and accounts .....	8.51	
	\$1,238.54	

Balance on hand this date .....

June 8, 1880. \$9.02

SCREW-THREADS AND NUTS.

The Committee on Screw-Threads and Nuts being called on for their report,



Mr. ORTOS said: I did not know that there was to be a report on the subject. I cannot say more than I did last year.

A committee was appointed to prepare a statement, and distribute it to the general managers and superintendents of all the railroads of the continent, recommending the adoption of the standards which were agreed upon last year. The circular was made out, so you are aware, with the intention of being so distributed; but in the meantime, there appeared to be some difficulty in respect to the tap-makers, for it seemed that the principal manufacturers in the country had variations in the sizes of their taps—something that was not quite established, a one hundred-thousandth part of an inch, I believe, and Mr. Forney has been good enough to take the matter in hand, and I think he could say something with respect to it.

Mr. FORNEY—At the last meeting, you remember that our committee was instructed to prepare a circular urging the adoption of the Franklin Institute standard. After that resolution was passed, the committee examined into the matter and found that some discrepancies existed as to the manner of manufacturing taps and dies. It is an illustration of the extreme difficulty of introducing a standard of any kind whatsoever, unless there is some sort of a record in the form of specifications or gauges—some ultimate reference. You may all know that the Franklin Institute standard was proposed by Mr. William Sellers, of Philadelphia, and was first adopted by the Franklin Institute. The standard specifies certain things, among them the diameter of the screw and the angle of the thread. When manufacturers commenced making those taps and dies, some sets of gauges were made by a man named Eves, in the city of New York. Those gauges were distributed around, and the Morse Twist Drill Company procured a set of them, and worked according to them. The Pratt & Whitney Company, of Hartford, when they commenced their work, undertook to work nearly to a true inch as it was possible to do, and for that purpose procured a set of Whitworth gauges from England. When the Erie Railroad undertook to introduce standard taps and dies, they found that when they took a nut from one manufacturer, and attempted to screw it on a bolt of another manufacturer, it would not go on. This led to the discovery that there were differences in the taps and dies of the different manufacturers of the country. This coming to the attention of the President of the Association, it was decided to ask Mr. William Sellers to come to the rooms of the Association and make a statement with regard to the matter. Mr. Sellers did that, and I think, was surprised to find that such discrepancies existed. The next thing was to induce the manufacturers to come together and try to reconcile their differences, and at this time the Morse Twist Drill Company, and the Pratt & Whitney Company are engaged in a most thorough investigation of the subject. The committee did not feel justified in preparing such a circular, so long as these discrepancies existed among the manufacturers of taps and dies; but as I say, in a very short time those discrepancies will be reconciled, and we shall have a standard by which we can be guided, and I would suggest that the committee be continued another year.

Mr. RAYMOND—And with instructions to issue a circular as soon as an understanding shall be arrived at, and that they have full power to act in the direction of securing the adoption of a standard. The motion, with Mr. Raymond's amendment, was agreed to.

#### ANNUAL DUES.

The committee on this subject made a report recommending that the annual assessment for each member should be five dollars.

Mr. SMITH—If any member thinks the amount is too small—and it cannot well be any smaller—he can pay more.

Mr. DAVENPORT—I wish some plan could be devised to make members understand the importance of paying their annual assessments. We are apt to feel an interest in a thing just so far as we pay for it. If we don't pay for it, we don't feel much interest in it.

[Here followed a very long discussion upon the financial affairs of the Association, and the practicability of increasing its efficiency. Various propositions were made, and finally the whole matter was laid on the table. As a full report of what was said would encroach too much on our space, we give a very full abstract which embodies all the essential points.]

Mr. HOPKINS thought it a hard thing for master car-builders to pay the expense of coming here when their business was solely in the interest of their employers. The Association was crippled for

means, and he thought a share of the burden of sustaining it ought to be borne by the railway companies. The members received small salaries, and had no individual interests to look after in attending these annual meetings.

Mr. SMITH thought that car-builders should not assume the responsibility of becoming members of the Association unless they could bear the expenses. He had been told that the Master Mechanics' Association received aid from the roads, and perhaps if the roads would be asked to do so, they would aid the Car-Builders' Association. They certainly would not volunteer to do it. Whether it is policy to ask for it is another matter.

Mr. ORTOS said the roads he represented not only paid his expenses in attending the meetings of both Associations, but also contributed to the support of the Master Mechanics' Association. He thought the Association should be recognized by the roads by receiving from them an annual money contribution, and that the Secretary should be paid something for his services.

Mr. DAVENPORT thought the general managers should be asked for a yearly contribution of ten dollars to support the Association, with the view of extending its usefulness and disseminating valuable information by means of circulars to be printed and sent out from time to time. The manager would say to his master car-builder,

"Here, we pay for this association, and I want you to go and get the good of it," and the attendance would in such case be quadrupled. Mr. Davenport moved that the Secretary be instructed to prepare a circular to be sent to general managers asking them to contribute ten dollars a year toward defraying the expenses of the Association.

Mr. FORNEY said the treasury of the Association was not in a very bad way. After the adjustment there would be in it from \$700 to \$800, which was amply sufficient for the present. Mr. Forney then offered a resolution that a committee of five be appointed to prepare a statement of the objects of the Association be presented to the general managers with the request that they send representatives to the meetings of the association; and that the secretaries of the Eastern and Western Railroad Associations, and the Joint Executive Committee, be requested to co-operate with the committee to be appointed, the latter to report at the next annual meeting.

Mr. DAVENPORT would agree to this, provided the managers should be requested to send ten dollars. He did not believe the Association would spoil by accumulating too much money. The money in the treasury was a special matter; we would not have any money next year from the same source. This was not a two-penny concern to be run on 25 cents a year, or on the leisure time of its officers. He did not propose to reduce the regular assessments upon members a single cent; but if we had three or four thousand dollars a year, it could be employed in making tests and experiments, and for other purposes to build up the Association and increase its usefulness.

Mr. RAYMOND thought the Association rooms at New York should be supported by the Association, and that similar rooms should be established somewhere at the West, where meetings could be held. The Association should not be dependent in any of its functions upon advertisements, much less upon manufacturers. He would make railroad companies members of the Association, and not Mr. A., Mr. B. and Mr. C. As it was now, there were a lot of members who were of no use. Let the managers pay an initiation fee of ten dollars, and make their road companies members of the Association, and also send representatives to these meetings.

Mr. SMITH said if we waited until managers joined and paid the expenses of the Association, we should wait longer than we will have to wait for a freight train brake.

Mr. RAYMOND said it would depend entirely upon the energy and capacity of the men who undertook to carry it out.

Mr. ADAMS asked how many members paid their dues last year.

Mr. SMITH replied sixty-five.

Mr. FORNEY did not wish to convey the impression that railway companies ought not to aid the Association by contributions; but it was essential as a preliminary step that the Association should be put upon a better basis. He would admit representations from each road, and each representative should be proportionate to the roads importance in the matter of voting.

Mr. RAYMOND wanted the railroads themselves to be members. It is not individuals that are wanted here—persons who can leave us and go into the supply business, farming, or the like. If a master car-builder goes out of the Association at

present, there is nothing left in it so far as his road is concerned. The relations of the railway should be with the railroads themselves, and then it will be a permanent institution.

Mr. FORNEY said that to become a member of an association of this kind involved very considerable obligations, but merely to send a representative does not bind in any way.

Mr. C. E. GAREY did not believe the Association was on its last legs. It was the Master Car-Builders' Association, and should retain its identity. Its recommendations were being adopted now faster than ever before. It was just beginning to be of some use.

The subject was then, on motion of Mr. Raymond, referred to a committee of nine, consisting of Messrs. Forney, Blackall, Aylesbury, Leighton, C. E. Garey, Davenport, Davis, Mileham and L. Garey.

#### SECOND DAY'S PROCEEDINGS.

The committee of nine appointed to consider means for increasing the efficiency of the Association, reported the following resolution:

*Resolved*, That a committee of five members, including the President, be appointed to prepare a statement of the objects of this Association, and to send representatives of the Association to the meetings of the railroads of the country, with the request that the latter send representatives who are master car-builders or foremen in the car departments, to these meetings for the purpose of aiding in carrying out these objects. The committee to be authorized to call a special meeting of the Association if they think it expedient to do so, and to make a report to the next meeting, and to recommend measures for increasing the efficiency of the Association and enlarging its usefulness; and to correspond with said managers with a view to secure their promises, so far as possible, that their companies shall subscribe to this Association, and send the heads of their respective departments to its meetings.

Mr. HOPKINS thought the Association was not only worth saving, but that it had within the past seven years saved millions of dollars to the companies it represented, in the increase of wheel mileage and car tonnage. He thought \$40,000,000 would not be too high a figure at which to estimate the saving. The cost of car repairs had also been reduced, and it was in consequence of the savings brought about by the Master Mechanics' and Car-Builders' Associations that railway companies could carry freight to-day at a profit for half the rates they received ten or fifteen years ago.

Mr. FORNEY referred to the fact that there was opposition to admitting any one as members of the Association who were not connected in some way with the car departments, and thought that in many cases some other officer or person would be more capable of discussing special subjects that might come up from time to time. He dwelt upon the advantages of uniformity in brasses, axles, etc. In such case their price would be reduced, they would become staple articles, and could be manufactured in advance and kept in stock. These things should be presented to the general managers and their co-operation solicited to aid the Association in bringing about such uniformity.

Mr. KIRBY thought it made no difference whether the man who came here was a master car-builder or a shop foreman, so long as he represented his road company. The roads should be allowed to send other representatives if they chose.

Mr. ADAMS said the impression prevailed that the Association met to have a good time, more than for business, and that the best way to correct this impression was for the managers and superintendents to meet with us. He was opposed to circumscribing the attendance as provided in the resolution, and thought the attendance of some of the higher railway officers at our meetings would add to the respectability of the organization.

Mr. C. E. GAREY could not agree with Mr. Adams. This was pre-eminently a Master Car-Builders' Association. Our Constitution so puts it. It is to be composed of master car-builders and foremen of railway car-shops. If the idea is to change all this, why that was one thing. If we want to preserve our identity, that was another thing. He did not object to the general managers and superintendents taking part in our proceedings, but he did most seriously object to making the Association an association of general managers and leaving out the car-builders. Railroad companies should not be invited to send representatives here who know little or nothing about the construction of cars.

Mr. ADAMS did not believe that the presence of some of the higher railway officers at the association meetings would work any change in the Association. There was a lurking idea in the minds of almost all of these officers that we came here for recreation rather than for legitimate business purposes, and the best way to correct this impression was for these officers to come here



and see for themselves. It would not change the condition of things in the least if our membership should be increased by a number of general managers.

Nor did he believe that if these managers sent their representatives here, they would send any but their own master car-builders. They would not be likely to send a man from the road department, nor an accountant from the office.

Mr. HOPKINS thought if managers were invited to send representatives here, it was not fitting that we should prescribe what their qualifications should be. He believed the master car-builders of the roads had the confidence of their general officers, and could worthily represent them, otherwise they should be got rid of at once. He did not think it was expedient to send a circular to the managers setting forth what the Association expected to do some time in the future. They would be apt to say: "You have been organized a good many years; instead of telling us what you are going to do, we would prefer to hear of what you have done." If any circular was to be sent, it should set forth the progress we have made, and the millions of expenditure that has been saved to the roads since our organization. He regretted that so many of its members of first rate capacity as car-builders, took no part in the discussions here. As an organization, we did not look back to where we were a dozen years ago, and consequently we were apt to lose sight of what had actually been accomplished.

Mr. RAYMOND said the question was how to render the Association more efficient. He wanted full and free discussion. If any member present was not benefited by it, it was his own fault. The Association had accomplished a great deal, very valuable preparatory work, and has done it well. Take the matter of standards, for instance. The work done is simply preparatory. You have no power to bring about their adoption. There was another matter in which improvement was needed. The committees of the Association were not bound to do the work assigned to them. They have not done it, as a rule, and will not do it. It was all wrong for managers to pay their own expenses here. Of what use was a circular asking railroad companies to send representatives to our next year's meeting? Something should be done at this year's meeting to remedy existing defects. He thought the railway companies should be solicited to join the Association and pay its expenses. Having got the Association to the size of a good, large, healthy baby, it should be put into the lap of the railroads and they should support it. Then we should have the two requisites of success—money and power. Rotation in office was also a matter that should be taken into account. It was a principle that should apply to all associations of this character, as helping to increase their efficiency.

Mr. L. GAREY said there was the same necessity for the Association to-day that existed sixteen years ago, when it was first broached. It was for mutual benefit, and recommendatory in what it did. Its acts were not final. When we attempt to make them so, we shall inevitably destroy it. The railroad managers themselves cannot make agreements that will stand any length of time; and it is likely that they can send representatives here who will make a compact they will agree to? His candid opinion was that the Association had been, and is now, doing its work as well as it can be done. It was not in debt. Its bills had always been paid, and paid by its members; and any one of them who paid his five dollars a year to keep the Association alive, and who could not get the worth of his money by coming to the meetings, ought not to complain of the support. The general managers and others, were invited to come here, they will not come; neither will they send representatives. If we talked to them about forming an Association whose acts shall be final, they will say, "Go ahead, and do it; if your act suits us we will adopt them; if not, not." The Association is right just as it is. When a standard is adopted by the Association, there is opposition, as there always is, to any thing out of the regular order. If the bare facts about the Association were presented to the managers, he did not believe that one in a hundred of them would object to their master car-builders going to its meetings, and that nine out of every ten of them would, if asked, pay their expenses.

The resolution was then read as proposed to be amended, as follows:

*Resolved*, That a committee of five members, including the President, be appointed to prepare a statement of the objects of this Association, to be presented to the managers of railroads of the country, and to correspond with said managers with a view to securing their presence, so far as possible, that their companies shall subscribe to this Association.

committee. The committee to be authorized to call a special meeting of the Association if they think it expedient to do so, and to report to the next meeting, a recommendation of increasing the efficiency of the Association, and enlarging its usefulness.

Mr. ORTTON was opposed to changing the character of the organization, by taking railway companies into it. It should be independent, and be carried on by master car-builders, as such. There was, however, no impropriety in asking the roads for pecuniary assistance. This was a different thing from asking them to come in and take possession. He thought the members of the Association were competent to manage its affairs, but as its doings were beneficial to railroads, it was proper to ask them to contribute to its support.

Mr. SMITH objected to receiving any aid from the roads for the Association, as such. The members might ask for it individually, but just so soon as the Association asked for, and received it, our name as an organization was gone, and we would no longer take any interest in it.

The whole subject was then, on motion of Mr. Aylesbury, laid on the table.

#### CAR-IRON AND STEEL-TIRED CAR WHEELS.

Mr. Robert Miller, from the committee on this subject, presented the following report:

##### CAR DEPARTMENT MICHIGAN CENTRAL RAILROAD.

To this date we have placed 198 42-inch car wheels under our cars; two Allen paper, steel tire, and eight cast-iron chilled wheels. The remainder were all cast-iron chilled wheels.

Out of the above 198 wheels, 86 chilled wheels have been removed, leaving 112 wheels which are still in service under our cars. Their use dates back to August, 1877. A few of the 86 wheels removed were taken out on account of broken tread or flange, and had tread resulting from defects in their manufacture. Of the remainder, one was removed on account of worn or sharp flange, three were worn flat, and the remainder on account of worn tread.

Sixty of the wheels removed, which were worn out fair and square under ordinary usage, made an aggregate mileage of 4,054,254 miles, showing an average of 67,571 miles. One pair made 122,775 miles, the only pair that have exceeded 100,000 miles so far. Several other pairs have nearly reached it, viz., one pair 85,000 miles, one pair 85,246 miles, and another pair that have made 95,328 miles. The others made all the way from 10,000 down to 50,000 miles, a few pair running below that. The performance of 42-inch chilled wheels under our cars has so far been rather a disappointment to us. We expected that they would show an average of about 100,000 miles, and in order to prove a profitable investment, comparing their first cost with that of 33-inch chilled wheels, they must make that number of miles even if we make allowance for the many advantages accruing from the use of large wheels. But, although the use of 42-inch chilled wheels has not resulted in a reduction in the cost of other services, in other respects, they have proved very satisfactory, and there are undisputed advantages to be derived from the use of large wheels that will go far toward offsetting an adverse result in wheel service by effecting a saving in car service and maintenance, as well as engine service.

The use of 42-inch wheels, as compared with 33-inch, should show a saving of about 27 per cent. in the ordinary wear of journals and bearings, and a like saving in the actual running expense of oil and waste, and if a record were kept, a considerable saving would undoubtedly be disclosed.

According to the testimony of engineers on this road, there is an appreciable difference in the draft of trains, especially in starting, in favor of trains made up of cars equipped with 42-inch wheel trucks. As the 42-inch wheel makes only seventy-nine revolutions to the foot that a 33-inch makes, there is, of course, less friction for the former to overcome between the journal and bearing, and the increased leverage obtained in the large wheel aids materially in overcoming it.

I am of the opinion also that the large wheel can better overcome the slight obstructions that are met in the perfection of track, etc., and will lessen rather than increase the draft on an up grade. From this, I calculate that the work to be performed by the engines will be less, which would show a corresponding decrease in the cost of engine service.

The pair of paper wheels now running under our cars, have made about 60,000 miles during the year that we have had them in service. They are running well, and judging from their condition and performance so far, they may be expected to make 700,000 or 800,000 miles. If they make what is claimed for them—500,000 miles—they will be an economical wheel to use. The eight cast-iron chilled wheels have been running under our officers' cars only a few months, and have, as yet, made no mileage to speak of. They have steel tire and should make pretty large mileage, and eventually may prove to be a very satisfactory and enduring wheel. However, we are placing a number of 42-inch Allen paper wheels under our passenger equipment, and I am inclined to think that they are the safest, easiest riding, and taking into consideration the many advantages derived from the increased size, the most economical wheel that can be used under passenger railway stock.

Finally, I would say that I fully endorse the use of 42-inch instead of 33-inch wheels under passenger rolling

stock. As regards freight cars, I am not sure that the possible increase in the cost of wheel service which might result from an increase in the size of wheels would be counter-balanced by the advantages arising from their use.

It may not pay to increase the size of chilled wheels under any circumstances, as the record of this road does not seem to show that the mileage capacity of the wheel is increased in the same ratio, but the wheel makers claim that the early wheels furnished were rather experimental, and that they were unable to produce as good a 42-inch wheel comparatively as they could a 33-inch, but that they have kept improving in the art until now they feel confident that they can produce a 42-inch chilled wheel that will make an average of 100,000 miles. Our record of 42-inch chilled wheels which are still in service, the early ones having been weeded out, tends very strongly to endorse their claims in that respect.

They are giving us much better service, some of them have been running a long time and have undoubtedly made large mileage, and I should not be surprised if our record would shortly show such an average for them.

ROBERT MILLER.

Mr. McWood (Grand Trunk), from the same committee, presented the following as his portion of the report:

##### FORTY-TWO-INC WROUGHT-IRON WHEELS.

There are 393 wrought-iron, steel-tired wheels, 42 or 43 inches in diameter according as the thickness of the tire is two and one-half or three inches, which have run mileage under passenger cars varying with the time in service from 724 to 860,694.

Of these wheels none have been re-tired and only two have failed so far, one of a fractured tire at 106,150 and the other a defective weld in the hub at 112,800. The average mileage of these wheels to date is 67,215.

These wheels are manufactured under the Mansell patent, the object of which is to provide a safe fastening for the tire, and it may be here remarked that one wheel (referred to above) ran for six months with the tire fractured without the slightest risk or danger, and was only removed when the flange at the point of fracture showed signs of giving way.

The thickness of the tires which have given the highest mileage to date was originally 2½ inches, and is now reduced to 1½ inches.

##### FORTY-TWO-INC CAST-IRON WHEELS.

There were fifty-four cast-iron chilled wheels put into passenger service, thirteen of which have failed at an average mileage of 81,363. The remaining forty-one wheels now in service have made to date an average of 97,440 miles.

Cause of removal as follows: Five, pieces chipped out of head; two, sharp flange; five, worn flat; one, cracked in brackets.

##### FORTY-TWO-INC CAST-IRON WHEELS, WITH STEEL TIRES PUT ON.

Six of one make were put into service, all of which have failed at an average of 60,577 miles, and one, cracked in brackets.

Cause of removal: Two, broken spokes; two, broken treads; two, worn flat and bad spool.

We have ten wheels of another make, having cast-iron centers, steel tires fastened on by a different process, none of which have as yet failed, their average mileage to date being 91,008.

Mr. McWood said that hot-boxes were almost unknown. They used the 42-inch wheel, and invariably found them perfectly balanced. He thought perfect balance was the cause of hot-boxes. Whether they were easier to ride upon than the 33-inch was, he thought, merely a matter of fancy.

Mr. McWood said: Your Committee on wheels distributed 300 circulars to the different railroads of the country asking their opinion on wheels.

We got replies to those questions from 16 different railroads, 13 of whom had had no experience with 42-inch wheels; and a majority of whom thought that 42-inch wheels would be too large for passenger service. Three were in favor of 42-inch wheels for passenger cars, and one against them. Of course we were quite aware that the 42-inch wheels were not yet in general use, and we expected to get a great deal of information; that is, information that would be of any value to the Association. There are three or four roads in the country that are using them to a considerable extent, and we got all the information that we could.

Mr. ORTTON—Were they all spoke or plate centres—those cast-iron wheels?

Mr. McWood—The six wheels that I referred to are all spoke centres.

Mr. ORTTON—May I ask you where you got the wrought-iron wheels?

Mr. McWood—In England. It is what is known in England as the Mansell wheel. It has a wrought-iron hub, wrought-iron spokes, and a rim all solid. The outside ring is turned off and the tire shrunk on.

Mr. ORTTON—It would be well if Mr. McWood would give us as much information as he could as to the price, and as to his own preference, whether he prefers the wheels with the Mansell centre, that forms, as it were, a channel by which the tire is prevented from coming off, so that in the event of tire care there is little or no danger of its giving way; and I would like to ask him, taking



the first cost of the wheels, and the service we are getting, whether he would give the preference to the Mansel or some other description of wheel.

Mr. McWOOD—So far as my experience goes, I should prefer this particular wheel. There was one of those wheels from which the inside of the hub fell off, that once through a defective weld. That was the only one out of the 393 that failed. The other was the case of a broken tire. It possibly had been shrunk on a little too tight. We run that for six months after it was broken; and you will notice, if you look at the diagram, the flange of the retaining ring is clasped into the tire on both sides so that it can move neither to the right nor to the left; it must remain just where it is. The wheel that I referred to, broke about the ninth of an inch. I took the tire off, turned the rim of the wheel a little, and put it on again. The wrought-iron is one of those wheels in my opinion that are indestructible. We calculate that many of those wheels are going to last over five or six years. We are perfectly satisfied that we are going to get 50,000 or 60,000 miles out of the tire. From our four years experience with them they are doing well; and we have been so pleased with the results that we are getting more of them. The cost is from \$5 10c. to \$7, 10s.

The President asked as to the average mileage of the 33-inch, as compared with the 42-inch.

Mr. ADAMS—We have, perhaps, as large a number of steel-tired wheels in service as any other company has of 33-inch, and are using some 42-inch wheels. We have seven cars with these large wheels which have been running about two years. They are all cast-iron, center-spoke wheels; we had had luck with them at first. For the last year we removed, probably about two-thirds of them in consequence of broken spokes, but have had no trouble within the past year. I have not the mileage with me. We have used the 33-inch wheels about ten years; have some 3,000 of them, and out of these a little over 100 have failed from various causes. Two pairs of them have been taken out from wear; they made 500,000 and some odd miles. We make a report to our general manager every year of the mileage of those wheels; and, in the last year's report that was made up some two months ago, we find that out of the 2,000 wheels, there had been 110, and some ten or fifteen that had failed; and the average mileage of those wheels that failed was something like a 100,000 miles. The balance, of course, have run various mileages. Perhaps the highest mileage is something like 350,000 miles. They run down to considerably smaller mileage, according as they had been put in. I should think the average would be 200,000 or 250,000 miles, as they stand now. If I thought the mileage would have been called for, I should have brought the figures with me. When we began with the 42-inch wheels, we had an idea that it was going to save us a large amount of power in hauling, and also that the cars would ride easier than on the 33-inch wheel. We did not find out our own track the difference in riding that we anticipated. We have quite a smooth track, and I do not think the difference would be perceptible where the track is very smooth. On a good steel rail, well kept up, I do not think the difference is very perceptible, except where you are crossing frogs or switches. The jar is comparatively slight with the large wheel to what it is with the smaller one. There is unquestionably a saving in the general wear and in brasses and oil, and undoubtedly a saving, everything else being equal, in the wear of the wheel. The matter of power we took considerable pains to investigate, and had Mr. Dudley with his dynamometer once or twice; and his decision with regard to it, after careful investigation, by his instruments, was that on a level track there was about 4 to 5 per cent. of power saved with the 42-inch over the 33-inch; but as soon as you come on a grade, your power is lost in proportion to the grade. If you get a grade sufficient, you would lose the whole advantage. He does not advise our company to use 42-inch wheels. He does not think there is any advantage in it, and I do not think we shall buy any more. We have just equipped a car with paper-wheels for our general manager's use; but for general use I don't think we shall buy any more 42-inch wheels; not so much because they failed, but because we do not think it is economy. We do not save power enough to pay for the additional cost of the wheels; but if the road was very level, and they were going to be confined to that level road, there is no doubt that there would be four per cent. of the power saved with the 42-inch wheel over the 33-inch. That is the result of our investigation after we have had them in use two years. I should think from Mr. McWood's state-

ment that it was a very cheap wheel compared with other wheels, much cheaper than the cast-iron center-wheel with the steel tire.

Mr. ORTTON—I think Mr. Miller might be able to give us some information about it. As I understood from him yesterday, they are going very largely into the use of the larger-sized wheel. He tells me that they are also using the Allen paper wheel. He might give us some information on that point that would be of interest. It would be interesting to know whether he gives preference to the cast-iron wheel or to the paper wheel.

Mr. MILLER—All I know about paper wheels, I suppose is embodied in Mr. McWood's report, as I was on that committee with him. Mr. Adams' statement that all the power gained on a level track is lost in going up a grade, I don't believe. It may be true, but I believe that I can demonstrate in a year or two that it is not true. I think I can demonstrate that figures do lie sometimes. As to the wearing of the wheels, that has been all reported. I am just as much in favor of the 42-inch wheels as I ever was. I believe there is a great advantage in them over the 33-inch wheels. Mr. Raymond finds fault with us very justly for not giving facts, but these facts it takes time to collect.

Mr. ADAMS—I would say, in connection with this matter, that our 42-inch wheels are the Washburne steel-tired spoke-wheel. As I said before, about two-thirds of them had to be changed; but we attributed that mainly to the fact of improper annealing. How long those we have will run I cannot say. Judging from their appearance now, of course, they are going to do exceedingly well. The matter of Mr. Miller's speaking about a wheel's making 800,000 miles, judging from its present wear, perhaps may be as exceptional as one pair I can name, which is a 33-inch wheel. It is a new make of wheel under one of Wagner's cars. It has made 78,000 miles, and I should judge from examining it frequently, that it is not worn over 1/4 of an inch, and I should judge that that wheel would make 80,000 miles. It may break; I cannot say now. If it is the wheel that we expect it is, it is going to be the coming wheel, because it can be produced for half the money of any other, except the ordinary cast-iron wheel. It is really a steel tire, although they do not call it steel. It is a new amalgamation of metal that produces a tread very hard, and yet it is so that it can be turned. We expect to turn the wheels when they make 100,000 miles.

Mr. KIRBY—While we are talking about these wheels, I will give my experience with 42-inch cast-iron wheels. We fitted up a set and put them under a car, and were not at all satisfied with them. They did not seem to ride so well as the ordinary 33-inch cast-iron wheel. We drew them from the axles, turned up a mandrel, pushed that through the bore of the wheel, and then rolled the wheel on the mandrel or plaid ways, and the same as a mechanic would true a pulley for a line shaft or anything of that kind, and we found that some wheels require 13 pounds to balance them. Now it is impossible to make a car ride well with wheels so much out of true as those were.

Mr. ORTTON—I believe the same difficulty is in existence with regard to the 33-inch wheels, and I do not think that that should be quoted as any disadvantage against the 42-inch wheel. With a carefully constructed wheel, I do not see why you should not have it properly balanced, and I believe that wheel manufacturers are competent to do that. If you are going to make a large casting, and you know that it has to run very true, you take care to have it properly balanced. Take, for instance, a fly-wheel. We should not think of having a fly-wheel running at the rate of 300 or 400 revolutions a minute, if it were not properly balanced; and I should not be stating a disadvantage against the principle of the large wheel. There are other advantages in connection with the large wheel. Taking the proportion of the 33-inch to the 42-inch, we can gain 37 per cent. In gaining that you take an equal advantage in reducing your axle-traveling; your axle will revolve 37 per cent. less, or something like that, showing that there will be so much less friction. We shall hence have a saving on the journal-bearing, and we shall also have an equal saving in the amount of oil or lubricating substance. If the wheel got into general use, then probably we could get manufacturers to get it nicely balanced. But I do not think that Mr. Kirby's statement should be so a disadvantage against the 42-inch wheel any more than any of the others. I have seen some of the 33-inch wheels that were very badly balanced.

Mr. ADAMS—In connection with Mr. Orton's remarks about the percentage of saving in friction on the journal, in the two years we have had these 42-inch wheels we have never had a warm box,

showing clearly that there is a gain there to a certain extent. We paid no more attention to those wheels than to any others. Mr. McWood says nothing about that. I do not know whether his experience agrees with mine or not. I would like to ask Mr. McWood whether he finds from experience that there is a perceptible difference in the riding of the cars between the 33 and the 42-inch wheels.

Mr. McWOOD—So far as passenger cars are concerned, I do not know anything about it, comparatively speaking. With our 42-inch wheels I never hesitated to turn a new car out of the shop and put it on an express train. That is to be attributed perhaps to a certain extent to Mr. Hopkins. We use lead-lined bearings. However, that is the fact. As to their riding qualities, the wheels that we have of course are wrought-iron, and are properly balanced; there is no possibility of their not being balanced. I have tried them frequently, and found not the slightest difference. As far as my experience goes, as to which is the easiest-riding car, I think they ride the easiest.

Mr. ADAMS—That was one of the advantages supposed to be gained by using a 42-inch wheel for ease of motion, and what led me to ask the question was to see whether others' experience agreed with my own. My own impression was when we first used the 42-inch wheels, that we should gain a decided advantage in riding. But I soon made up my mind that the advantage in riding over a smooth rail was far more in imagination than anything else. So far as balance of our wheels is concerned, I am not clear about that; but I suppose they don't vary a great deal; and the one advantage that I can see on a smooth rail is in passing frogs and switches. We can see a decided advantage there. So far as heating is concerned, I do not know, but I give perhaps too much credit to the 42-inch wheel in that matter. We have a plan for reporting hot boxes similar to Mr. McWood's. We have had only 12 hot boxes reported in a year; and the majority of them have been under cars that are on a long run. In running a thousand miles the car might perhaps get a little overlooked. In two or three cases we have had cars reported for hot boxes, but I think the record is pretty good; only about an average of one a month for a year.

Mr. ORTTON—I would move that the subject be continued another year.

The motion was agreed to.

The President appointed the following committees:

Committee to prepare a plan for holding the next annual meeting: J. N. Mileham, L. S. Young.  
Committee to present resolutions on the death of W. W. Wilcox: William Campbell, John Kirby, M. N. Forney.

The report of the Committee on Accidents to Train Men being called for, Mr. KIRBY said: That committee hasn't any report to make this year. We supposed the ground was so fully covered last year, that we did not consider it necessary to go over the ground again. That ground, I think, was pretty thoroughly explored last year by the report of the committee. How many have adopted the recommendations of the committee, the members know themselves.

#### REVISION OF RULES FOR INTERCHANGE OF CARS.

This subject was taken up, and the Rules as heretofore adopted, read serially:

Rules 1st and 3d were confirmed.

Rule 3 was read, when

Mr. ADAMS said: I am satisfied that all the railroads do not go by those rules. They do not stop cars when they find splices spliced improperly. I am willing to admit that some circumstances may occur when people cannot always comply with the rules; but it certainly would be an easy matter for any party if they were splicing a sill to splice it where the rules require it to be spliced. This is not an impossibility at all. It is within the reach of every one, and it is plainly defined how the splices shall be made. It does not matter whether in our judgment it is the best place or not. We have agreed in convention here that we will fix certain ways in which splicing shall be done, and certain places where splices shall not be made. It is within the reach of every individual doing the work to do it just exactly as defined, so that there is no possible excuse for not doing it. It is certainly no uncommon thing for us to receive cars spliced entirely different and in different places, and some middle timbers spliced, which is expressly forbidden. I do not know whether others have the same experience. I presume they have more or less.

Mr. BLANCHARD—We have been put to considerable trouble in our inspection with regard to flat spots not exceeding 2 1/2 inches in diameter. It is



a very good way for other roads to get rid of their flattened wheels. I have known wheels flattened  $2\frac{1}{2}$  inches. We could not reject the car; but by the time it had been over our lines it was flattened  $2\frac{1}{2}$  inches, and the car was rejected by the other line.

Mr. VERRIBY—We frequently have that trouble. I do not see any way of getting over that but by taking the car under protest and marking it to be received so; and if it were worn more when it came back, I should think the road ought to receive it.

Mr. ADAMS—There is provision for that matter in Rule 10. We have a right to take that wheel out and charge it to the company owning the car. We never refuse a wheel under any circumstances, if it is sound, unless the spots are so flat that we feel that the company offering to deliver the car to us ought to put a wheel instead of ourselves. For instance, at Albany we have no shops that have a wheel press, and for that reason in the case of a wheel from the New York Central, with a  $2\frac{1}{2}$ -inch flat spot, we should say, "We want you to fix that." But if we received a wheel  $2\frac{1}{2}$  inches, and we found that it was likely to be  $2\frac{1}{2}$  before it reached Albany again, we should put in a new wheel and charge it to the company owning the car.

Mr. ORTTON—I do not think any of these wheels are flattened except by sliding. The corresponding wheel not being flattened, is because that wheel has been much harder than the flattened one. But I believe in any case that those flattened wheels are more or less caused by sliding; and the way I understand this rule is, that it indicates which company shall have the inconvenience of putting the wheels in. If a wheel is flattened  $2\frac{1}{2}$  inches, we cannot refuse it; and by the time it gets to the end of our line it may be  $2\frac{1}{2}$  inches; and it simply follows that we have to put on new wheels there, and to make our charge. It is not that we shall bear the expense of it, but it is merely the inconvenience. There is no special hardship that I know of; because I think that kind of thing works both ways. If we deliver one pair of wheels with flat spots at Buffalo, the chances are that before it comes back it will be largely flattened. Perhaps before it has got to New York there has been a necessity to take the wheels out, and naturally we will charge the owners of those wheels with that. I think those wheels, flattened by sliding or otherwise, ought to be put in at the expense of the owners of the car. There is a great deal of hardship, I believe, in the question of sliding, and you cannot possibly get out of sliding the wheel sometimes. Your train men are apt to utilize the brakes that are nearest to them, and one or two cars on a train will get the brake power. I know that I have had a great deal of trouble about that kind of thing. Where there is once a flat spot it shows there is a softness, and the probability is that you will find three or four flat spots very close to each other. When we make a report we say flat spots extending 8 or 10 inches. Some people cannot understand that remark. They say a flat spot must be a dead flat spot, and that it must have been done on our road.

Mr. YOUNG—We get a great many that are flattened. One wheel will have a crumbling spot in it, while the other one will be perfectly good. If it were caused by sliding, there would be some indication of it on the opposite wheel. The great majority of flat spots result from a soft chill crumbling out. I think the roads owning the cars should be made to pay for crumbling flats, but not for the slid ones.

Mr. ORTTON—If you have your brakes adjusted with a leverage of four to one, the chances are that they will slide the wheels most assuredly. Now whose fault is that? Is it not the fault of the owner of the car, that he has such a powerful brake? In a case where the power is two to one, there is no possibility of sliding the wheels. I have seen that repeatedly—4 to 1; and a man who can apply 50 or 60 pounds on the lever stops the wheel, and when he finds that he can stop a car more easily he will use that particular brake, and he is tempted to do it by the owner of the car. There are many cases that crumble, and that is the fault of the owner of the car. I think the hardship would be equal upon everyone. It would just be as broad as it is long in the end. I endeavor to make my reports very correct; but they are often unsatisfactory. If I were to say "worn out" they would probably pay the bill; but if I say "flat spots," they say: "You have been sliding our wheels;" but we cannot help sliding their wheels.

Mr. C. E. GAREY—I suspect that Mr. Orton is rather driving at our road a little, because we make our levers four to one; and we calculate that we have got a good brake; and everybody that

runs our cars says so. It is a brake with which they can stop the train without running into some train ahead of them. And now it seems to me that it is better to have a good brake, even if you do slide the wheels occasionally, than to have a brake that is not good, and that will let one train run into another.

Mr. ORTTON—I am glad to hear from Mr. Garey that he has a leverage of four to one, as I shall know to whom to look hereafter. It is easily demonstrated that if you want to stop a train quickly you should not stop your wheels, but allow your wheels to run.

Mr. C. E. GAREY—I agree with Mr. Orton, that the best way to stop a train is not to stop the wheels. But here is another point. You take a car empty, that is running, and your brake is all right. You take a car and load it with 15 or 20 tons of freight, and how are you going to graduate that brake so that it will brake just right, under the circumstances? Unless you have a train-brake, it seems to me that you must make a little of all your wheels and hold your train; but so long as it is necessary for two or three cars to do all the braking of a train, it looks to me as though we ought to have some good brakes on our cars.

Mr. AYLESTORY—I would suggest that men who may have objections to any of these rules, should put them into the form of a resolution, so that we won't talk all day without accomplishing anything.

Mr. ORTTON—I think that under this rule, as it stands, wheels may be refused for over  $2\frac{1}{2}$  inches. But rule No. 10 is objectionable; it defines who shall pay for the wheel. We know that recently there has not been very much profit in putting wheels in, and I would rather that we never put in wheels at all; but it is clear to me that somebody has to put them in, and I should be willing to put them in wherever they exceeded  $2\frac{1}{2}$ .

The rule was adopted without amendment; also rules 4 and 5.

Rule 6 was read. It provides that a card of a prescribed form be placed under the body of the car for the guidance of inspectors, stating the defects with which the car will be received back.

Mr. ADAMS—I have objections to running a car two or three years with a card on it, or even six months, or three or four, perhaps, which is no uncommon occurrence. Cars will come down with a card and be received back all right. Back they come again with the same card they had before, and so on for two or three trips. I don't believe in repairing cars with cards, although it is all well enough to facilitate the movement of a car for one trip.

Mr. YOUNG—I should like to ask Mr. Adams why he would refuse a car the third time if he is not to refuse it the first time, if it is in as good condition.

Mr. ADAMS—The reason is this: The fact that it has a card on it is an acknowledgment that it has been injured. The very acknowledgment given in putting a card on is enough to commit the owners to have it repaired.

Mr. CHILDS—I think that the explanation of Mr. Adams' objection is that the car goes West with a card on it, and comes back East by some other route. I should like to see that rule amended so that a company that has more than one point on their road to receive a car should be obliged to receive that car at any point on the road, and not at the particular one where the card was put on. I have had cases where they have been refused.

The President—There are some cases where cars will not be received except at the point where they were delivered. In these cases we should have no control over them.

Mr. KIRBY—I don't think we could make any rule that would cover all the cases that have been brought up here; but the rules themselves seem to govern us so far as to assist us very much in this interchange of cars. About these flattened wheels, each road seems to be a sufferer, so that it is pretty general. I apprehend that we could not amend those rules very much. In relation to the cards that Mr. Adams speaks of, I have a case in hand now. It is a Fort Wayne, Jackson & Saginaw car. It has a card on it that the car will be received at Jackson. The car is delivered to us, not at Jackson the second time, but at Toledo. That is the reason why Mr. Adams' cars come back with the same card so many times. We want to work mutually, and then we shall have no trouble with the rules, I think.

Mr. ADAMS—I do not think the rule can be improved much.

The President—I would say a word in reference to the complaint Mr. Adams makes of cars being returned several times within a very short time. We have transferred some cars four times at Al-

bany while trying to get them home for repairs; and within a week past our company have issued an order, forbidding our agents on the line of the road to load any cars that are marked for return home. The difficulty is in the cars passing the inspector on their way home, light, and being picked up by an agent at some point on the line, loaded and returned again. That covers the case that Mr. Adams refers to, and which seems to be a nuisance, as it is with us, we ask our officers to issue orders to remedy the evil, which I can say our people have done very readily, and I apprehend much less trouble hereafter than we have had on that score. The object of these cards was to facilitate the movement of freight. I think it has materially helped in the past, and I think its more general use would help us very much in the future. There are hardly any cars that come to an inspecting station where one road delivers to another that have not some defects, mostly defects which can be repaired with very little trouble and very little time, and others that cannot be repaired, but still leaving the car in good condition to go to its destination and return. By the use of these cards cars can pass to their destination without any hardship to anybody, and I would like to see them more generally used. It would appear that some roads do not like to use them, because they fear that they may in some way become responsible for something, they do not know what. It simply holds them responsible for what is named on the card, and any road which would feel any difference in being responsible for what actually belongs to it must have a queer set of officers.

Rule 6 was adopted; also Rules 7, 8 and 9, without discussion.

Rule 10 was then read. It provides that wheels and axles used to replace those worn out by fair usage shall be charged to the road owning the truck. It also relates to the condition of wheels.

Mr. KIRBY moved that the word "truck" be changed to car. The owner of a car can almost always be found, but not the owner of a truck.

Mr. MURPHY—I would say that for the present, and probably for some time to come, we can't do that on our road. There are probably some three or four different kinds of trucks under our cars. This will probably be done away with in time.

Mr. ORTTON—There are many roads concerned in this question. I hold in my hand bills against two of these roads. We have tried in every way to find the owner of the trucks. The railroad owning the car ought to have the means of finding the owner of the trucks. We find the necessity of changing the wheels belonging to the trucks. In such cases I make a bill out against the company owning the car. They say, "Oh, this car is new, but the truck is not ours." We have three or four bills of that kind standing. I have charges against the U. S. Rolling Stock Co., another against the Western Rolling Stock Co. I go with Mr. Kirby in this, and would I say, change "truck" to "car."

Mr. WIESS was understood to say that in his opinion the charge should be made to the body of the car, for the reason that all mileage is paid by the body.

Mr. SMITH—I think I can see where it would be manifest injustice to some roads, particularly to the Erie; their car has somebody else's truck under it. They remove a wheel that is broken in fair usage, and they have to charge it to their own car, though the truck is not theirs. There may be no means of finding out the owner of the truck. I think it would be decidedly unfair to put it to the car.

Mr. LENTZ—I do not see that the matter of charging the wheels to the trucks would be an injustice to the Erie or any other company that is putting other companies' trucks under their cars. Where we have put wheels under trucks and had no way of ascertaining the name of the owner, we have rendered a bill against the car owner, and they have declined to pay it. It seems to me the car owner is the proper person to pay for wheels under the trucks, and that the bill should be rendered against the owner of the trucks.

Mr. SMITH—Suppose that the Lehigh Valley took a set of their trucks and put them under an Erie car. The car goes out on the Erie, Mr. Orton's road, and he changes the wheels and charges it to the car?

Mr. ORTTON—If the President will permit me, I will read a communication on this subject that I received. "I return the bill for wheels applied to a certain car, which I do not approve. From the makers of the wheel and the letters on the truck, it is evident that the bill should be rendered to some rolling-stock company instead of to this road. I wrote back to ask them if they could tell the owner. They answered as follows: 'I am not able to get the owner of the truck, but I am informed



that somebody in Columbus is an officer of the company, and he may be able to give you information." I wrote back to say, "Still, I think the onus should be on you to find out who is the owner of those trucks." That is merely one case of a lot.

Mr. KIRBY—Mr. Orton's experience is just what my own has been several times, and I find several other roads in the same situation. It is generally considered, when a measure is proposed, that the result is for the general good. I do not consider if we are injuring two or three parties. If two or three parties are injured, we do not consider that the result is for the general good. There are two or three parties at our meeting who feel a little aggrieved, and would like to make a change. But shall we consider that against the weight of the other side?

The motion to change the word "truck" to "car" was agreed to.

Rule 11 was agreed to without amendment.

Rule 12 was agreed to after striking out the word "trucks," to make the rule correspond with rule 10.

Rule 13 was read, prescribing that a foreign car shall be repaired with same form, kind and quality of material originally employed.

Mr. ADAMS—This obliges us to use exactly the same kind of timber and every thing exactly of the same kind in every detail if we comply with the rule. We have had a little misunderstanding of this kind with our friend, Mr. Miller. If that could be amended in such a way that it would admit of first-class material, or material that is generally accepted by a majority of the car-builders, I think it would be better.

Mr. ORTON—I think that if we were to make any opening, the chances are that our cars would be very much disfigured. I think it will be better to keep it strictly to what it is.

Mr. ADAMS—I am willing to let it stand if we can be exempted from some trouble that we now get into. Mr. Miller and myself talked the matter over. He has a lot of cars built that are good cars, and he has those middle timbers to which the draw-sticks are attached, of oak. Now, we do not have any oak down in our country that is suitable for sills, but we use Southern pine, and I believe it is admitted all over the country to be about as good timber as we can get for car purposes. We broke one of his sills, and we put in a pine sill, and he complained of the timber as not being so good.

Mr. VERBECK—I have had the same difficulty that Mr. Adams speaks of. In one or two instances I put in Norway pine. In other cases I had to give an order for oak. It gives us some trouble and occasions a detention of the cars.

Mr. ADAMS—We get a great many sills that are spruce. Everybody knows that spruce is not as good as Southern pine.

The rule was adopted as printed.

Rules 14, 15 and 16 were adopted.

Rule 17 was read. It provides that a company destroying a car, if it elects to pay for instead of re-building it a deduction shall be made by the owner for depreciation of truck or body, not over six per cent. of market price.

Mr. TAYLOR—I do not think it is right to divide the trucks from the body. It works to the disadvantage of a great many roads. I think they should be paid for together.

Mr. ADAMS moved to strike out the words "provided, however, that such allowance shall in no case exceed sixty per cent. of the established price."

Mr. ORTON moved that the rule stand as printed.

Mr. ADAMS—May I ask Mr. Orton a question? Suppose we get a car out of your shop and it gets on to the New York Central road, and they destroy it the next day. It cost you \$500. Are you willing to take sixty per cent. of the cost of that car?

Mr. ORTON—I do not think Mr. Adams understands the pith of this rule. It takes 15 years, according to this before you can reduce the value of your car to 40 per cent. of its original value. If you take it at six per cent. per annum, it will take 15 years to take this 60 per cent. away. The scrap will be worth 40 per cent. that remains.

Mr. FORNEY—I move that the price of a new car be fixed at \$500.

Mr. TAYLOR—I move still further to add, "provided that the new car shall be valued at \$500, and the allowance to be made shall not bring the price below \$500."

Mr. ADAMS—I may misunderstand the reading of the rule, but I know that it gives the party only 60 per cent. of the value of a new car. We worked a number of years under the six per cent. per annum depreciation, and very satisfactorily. Somebody worked in this provision last year. I don't see any object in it at all. If a car is 15 years old, and has depreciated six per cent. per annum, it is

worth so much money and no more. A car depreciates so much a year. That is universally admitted. Let us pay what the car is worth.

Mr. ORTON—I would like to ask Mr. Adams if he has not some cars running on his road that are 20 years old?

Mr. ADAMS—I have.

Mr. ORTON—Then you would not get a cent for one of those cars. Suppose you have got a car 20 years old, and it is destroyed on our road. I ask you to send in a bill, and you will have to send a bill for nothing. But by the arrangement of this rule you are bound to get \$178, and there is the reason after you get the value of your scrap, the depreciation stops.

Mr. ADAMS—I am sorry I have not got a schedule of those figures, but I know well enough that it is not so, because I have got it figured down to different prices—this six per cent. per annum depreciation figured down to 20 years on a number of scales—and in no case in 20 years can I get down below what the scrap is worth.

On motion of Mr. Aylesbury, the motion and the amendment were laid on the table.

Rule 18 was amended by fixing the following cost prices for settlement:

Box car, \$450; stock car, \$450; flat car, \$350; 8-wheel gondola, \$375; 4-wheel coal car, \$225; 4-wheel box car, \$250.

Rules 18, 19 and 20 were agreed to as they stand, except 1880 for 1879 in latter.

The rules as amended were then agreed to.

### THIRD DAY'S PROCEEDINGS.

The Treasurer's report was reported by the Auditing Committee to be correct.

The report of the Committee on Standard Axles being called for.

Mr. FORNEY said: We have prepared no written report, nor is one necessary. The Committee last year conferred with the Committee of the Master Mechanics' Association, and they agreed to adopt the Master Car-Builders' standard axle.

The Committee was discharged.

### SUBJECTS FOR NEXT MEETING.

The Committee reported subjects for the next meeting as follows:

1. Train brakes for freight cars; the committee to be continued.

2. Substitution of steel for iron and iron for wood in car construction.

3. Improvements in cars during current year; a new committee to be appointed.

4. Cast-iron and steel-tired car wheels; the committee to report upon the best diameter for these, and on the means which should be adopted to maintain uniform diameter of wheels which are nominally of the same size; and whether the tread of the wheels should be coned, and to what extent; two new members to be added to the committee.

5. To recommend a form and dimension for a standard draw-bar and draw-spring, and the best method for bringing about uniformity in their construction; the committee to investigate and report whether a pair of dead blocks or a single buffer-block gives the greatest security to train-men and protection to freight cars, and to recommend dimensions for each.

6. To investigate and report whether it is desirable and economical to apply brakes to all the wheels of freight cars, and the best way of bringing about uniformity in their construction, and to recommend forms and proportions for standards for those parts of brakes which require most frequent renewals.

7. To investigate the causes of accidents to train-men and report what means can be provided to protect train and yard-men from injury while in the performance of their duties. The Yardmasters' Association is invited to communicate with this committee.

8. The subjects and committees numbered 9 and 14 in the last annual reports to be consolidated into one. These are the Committee on Standard Screw-threads, and the Committee to Prepare a Memorial to Managers on the Necessity of Even Sizes of Screw-Threads.

9. To draw up a circular for distribution embodying the necessities for brake staffs being placed in the same position on all freight cars.

10. The committee recommended that a new committee be appointed on this subject.

The report of the committee was adopted.

### POSITION OF BRAKE-STAFFS.

The President asked for an explanation why the committee appointed last year to draft a circular for distribution on the necessity of placing brake-staffs in one position on freight cars.

Mr. ADAMS—I would say, in reference to the matter, that Mr. Kirby and myself talked the matter over, and concluded that there was no more to be said about it; and as the New England roads are about the only roads that are under the necessity of making a change, we didn't think it was necessary to call the attention of the roads to it generally throughout the country, and as the New England roads are making the change as rapidly as they can, and, for all practical purposes, they seem to be complying as rapidly as required. There are no new cars

built on our roads that I know of, where the staff is not put where the Association directs. That is the only excuse we have for neglecting to bring in a report.

The Committee was continued another year.

Mr. ADAMS—Do I understand that this committee is to recommend some different position for the brake staff from what is at present in use? We voted some two years ago to fix it on the left-hand side of the car when you stand facing the car, and I believe it was agreed unanimously that that was the position for it. Some, I believe, are putting it back on the top of the car some two or three feet. The committee ought to understand whether they are to confine themselves to the style that is generally used. As I said before, the New England roads commenced wrong, and that kept it up until within a few years. Since that vote was taken, I think the roads generally have made an effort to make a change, and have changed on all new cars and old ones as fast as they are repaired.

Mr. VARNER—We put our brakes on what I call the right-hand side, as you stand on the platform of a passenger car, and I never thought to put the brakes on any other side of a freight car. All the brakes on our freight trains are on the right-hand side.

The President—I understand that it will be the duty of the committee to recommend the placing of brake-staffs in the position decided on by the Association some time since. That is, to bring through a circular the notice of the railroad companies to the necessity for placing the brake-staffs in one position on freight cars. It would suggest that it might be advisable, in addition to the brake-staffs, that the ladders on the cars, especially those offered for interchange, be all in one position.

Mr. FORNEY—I move that that be added to the duty of the committee.

Mr. AYLESBURY—I believe you will find a radical difference of opinion, Mr. President, on that point.

The President—I am well aware of that, sir. I would say for the information of some parties, that in some states roads have placed their ladders in a position which is prohibited in cars passing through other states, and vice versa. It is actually necessary in order to pass these cars through all the states that there should be one position in which the ladder rounds should be placed, in order that the cars shall be available at all points and at all times, and for that reason the suggestion was made.

The motion was agreed to.

### WHEEL-GAUGES.

The President—The subject of the variety of lengths of gauges used at our various shops for fitting wheels for trucks of the same gauge is now in front of me. I have been informed that some of the roads have made the gauge of their trucks 4 feet 8 1/4 inches, instead of 4 feet 8 1/2 inches, and that the difference in lengths of gauges for fitting wheels varies something like one inch. It appears to me that it is very necessary that we should have a standard gauge for fitting wheels for the standard gauge roads in the country. I have also been informed that the tracks on some of the roads vary nearly one inch in gauge.

Mr. FORNEY exhibited a sketch, showing the form of the head of the rail used on the Erie and Pennsylvania railroads, and said that on some roads they measure the gauge over the distance from the top of the head, while on other roads they measure over the distance from the lower part of the head, which makes a difference of about three-eighths of an inch in the gauge.

Mr. SMITH—I move that a committee be appointed to get the information from different railroads and get a wheel-gauge for fitting their wheels and the distance of their tracks; that they get it from all the railroads in the country, and report it, and let our Association have a standard gauge for fitting wheels if we can.

Mr. ADAMS—We might, of course, fix a gauge. Everybody knows very well that a road which is very crooked, there needs to be more lateral motion between the wheels and rails than on a straight line. You go into New England and you find that the roads are very crooked, and that there is more lateral play between their wheels than the roads West generally have. I will refer to Mr. Britton, of the New England road. He claims that he could draw four or five cars more by having a large amount of play between the wheels and rails, than he can if they have a tight gauge, and that is why they are moving their gauge out. Perhaps it would be well enough to fix a gauge, but you cannot change the opinion of the general managers about that at present. We gauge wheels of the Boston & Albany road so that there is about



$\frac{3}{4}$  of an inch play between the rail and the flange of the wheel at the point it strikes the rail. The rounded edge of the rail corresponds to the curve of the flange. You will see readily, by that drawing, that, when the wheel is up to the track on one side tight, you have got about an inch and a quarter to an inch and a half outside of the rail on the other side; and there is no possibility of its getting in between the rails. I am very glad to learn, since I have been here, that even the New York Central cars, on account of gauge, get in between other people's rails. There has been a good deal said about our gauge. We have had a good many of our cars rejected on account of the gauge being broad. We have cars that have been running for five or six years with the same gauged wheels on them. They won't be received on other roads now; I do not understand it.

Mr. VEEBRYCK—I have had a good deal of trouble in respect to the gauge of wheels, particularly with the Pennsylvania line. It is well known that their road is a wider gauge than ours. Ours is 4 feet 8½ inches. I need to give my wheels  $\frac{3}{4}$  of an inch lateral motion, but having to interchange a good deal with them, we bring our wheels 4 feet 8 inches, and since I have done that I have had no trouble, except with some of the old cars, which had more. They would not take them. They gauge between the flanges just as well as they do over the tread. Some little time ago our general manager asked me what was the reason they refused so many of our cars. I investigated and found that it was not on our main line, but on our Keokuk division, the wheels of which we did not alter when we took their road. At the time that he spoke to me about that, I told him that I did not think the Pennsylvania Company ought to refuse our cars when we received theirs with only a quarter of an inch. It is a great deal less than we want to run on our line, their wheels being 8½. I think that is too tight, rather tighter than we want to run on our road.

Mr. DAVENPORT—Perhaps some of the members may think that this is a matter of not much moment, and that it hardly pays to discuss it, and perhaps they think there is not much difference in gauges anyhow. If they will go through a shop and look at the stock of gauges on hand, of the standards, then they will make a discovery. I am very glad that this matter is up for discussion; I think that we should look at it pretty closely. There is about the right amount of play to be given, and if we fail to give it, we consume a needless amount of fuel, and we grind out a needless amount of rails. The Lake Shore Road changed their wheel gauge at the request of their chief engineer. He observed that the wheels could stand more than the rails, and that his department was called upon to respond too largely for repairs for tight running wheels, and yet the Lake Shore did not run, so far as I know, any tighter than the majority of roads. I know a road that ran wheels a great deal tighter, and complained that their engines would not haul very heavy trains. If your wheels are grinding out your flanges on the rails, you won't draw heavy trains. I think you will find the tendency has been to increase the allowance—the play as it is sometimes called—of wheels on the rail. I remember just now having a discussion with a railroad man who is an advocate of running wheels tight, and he discovered that the wheels removed from his road were removed almost entirely for one cause, and he asked my opinion of what was the reason that the flanges cut out on his road. Well, I said, that is a fair question. Did it ever occur to you what made them cut out—that there is not any particular attraction on your roads between the rails and wheels that made them cut out. But you force them so tight to the rail that they grind them out. He was running his wheels pretty nearly a half-inch tighter than the Lake Shore at that very time—pretty nearly a half-inch less play. He had about a quarter of an inch play on the inside of the wheel, and moved over his line between the wheel and the rail. You can readily imagine what the result was, both in cars and rails. This is a very important matter. It involves a tremendous amount of expense, not only in car repairs, but in fuel and in track.

Mr. VEEBRYCK—I perfectly agree with Mr. Davenport about that. We ourselves are rather close, but I should like to have him that we see to in a case where we have to interchange with the Pennsylvania line. What are we going to do unless we hang our wheels so that they will take them, unless we use broad-tread wheels, which we do not want to do.

Mr. BLACKALL—We have had the same trouble with the Pennsylvania road. I do not see why the

Pennsylvania Railroad should control all the railroads in the country.

Mr. VEEBRYCK—I agree with Mr. Blackall about that, if we could only get our managers to think the same as we do about it.

Mr. YOUNG—Our wheel gauge was made 4 ft. 8 in., but we found a good deal of trouble, a d complaint from hot flanges and hard pulling of the train. There was a vast difference between handling a train with that and the compromise gauge. When we came to change the wheel gauge to 4 ft. 8 in., we found that we could not handle as big a train. We could not handle it with the same ease as we did before, so we changed our wheel gauge to 4 ft. 7½ in., which has been going on gradually for a year and a half, so that all wheels put on since then have been put on with a narrow gauge; and in order to comply with the request of some of the other lines, we had to add to the tread of the wheel outside one half-inch, making it about half way between a narrow and a broad tread wheel.

Mr. VEEBRYCK—I would like to ask Mr. Young how much that adds to the weight of his wheel?

Mr. YOUNG—I am not able to say, but it is very little—an inch and a quarter in depth and half an inch wide.

Mr. HILDRUP—I can tell you some experience that I had with the Pennsylvania line. I built a lot of cars. They went to Philadelphia and they were all right and they were sent west to Erie, and they took the wheels and pressed them on a little closer. They did go back to Philadelphia and they would take another turn at them, and send them back again. The difference between them and railroads generally is that their track is about 1 foot 9 inches. The gauge of the Pittsburgh, Fort Wayne & Chicago was 4 feet 10 inches. The former practice of the Pennsylvania and the Eastern States was 4 feet 8½ inches. They gradually widened their old track and narrowed the Ohio track some. On the Pennsylvania tracks they have a close gauge, and on the Ohio tracks a loose gauge. A three-quarter inch play would be, in my judgment, the right play on any gauge.

Mr. FORD—I think Mr. Hildrup hit the point exactly. It is what I wanted to bring out. It is useless, I think, for us, as an association, to undertake to establish a standard gauge until the railroads establish a standard gauge for their tracks. As long as we have a 4 ft. 10 in. gauge, and 5 ft. 8 in. gauge, or a 4 ft. 8½ in. gauge, in gauge on the track, how are the master car-builders going to establish a standard of gauge that will fit all those tracks? Just so long as we have that variation in tracks, we shall have that difficulty. The trouble was in the gauge over the wheels from out to out, and it was found necessary to put into the hands of the P. C. & St. L. road the permanent gauge which gave them the outside limit and the inside limit. Of course the inspectors had to use a little judgment in regard to those wheels where the flanges are more straight. When we came to running cars over a 4 ft. 9 in. gauge track, and a 4 ft. 8½ in. you will find that you have got considerable difference in the play of the wheels on the track; and the first thing to do, it seems to us, is to bring the tracks uniform, and then I do not think there will be much trouble in establishing a standard gauge. The standard gauge for the inspectors of the P. C. & St. L. is 4 ft. 8½; that is the extreme outside limit. The extreme inside limit of the wheels—that is, as narrow as they are permitted to pass on account of the strain on the guard-rail—is about 4 ft. 5 inches, and from out to out, it is 5 ft. 4 inches. That was decided on by our head officers as the extreme.

Mr. DAVENPORT—I think there is a misapprehension in this Association with regard to its moral power; but I call you to witness, brethren, that whenever this Association has settled a point, just follow that point and see how rapidly the roads march up to it. I have heard objections, but they all keep making up toward it. Now, I agree perfectly with Mr. Ford. We cannot say to the Pennsylvania road, you must change your gauge. We could say it, but it wouldn't do any good. I think we can afford to say that in our judgment three-quarters of an inch play between the wheel and the rail is the best. Every master car-builder who has a 4 ft. 8½ in. gauge can certainly, if he chooses, make it 4 ft. 7½ in. for his wheels. It does not seem to me that the Pennsylvania Railroad will be very long wiping out that half-inch. A railroad company, when their principal officers are satisfied they are losing money in pursuing the course they are pursuing—and that by adopting something else that the Master Car-Builders have decided to be the best—will give more if they will not be slow to adopt it. My acquaintance with railroad officials does not warrant me in believing that those men are pig-headed and insist

upon doing something which is against the interests of their company. Several things have been decided by this Association to be desirable things, and they have been adopted. Those things are revolutionizing the practice in regard to those points. In regard to this gauge matter, we have not the legal power to do anything. We have a deal of moral power, and what is settled here goes a great way, if carefully done, in influencing the railway companies. So don't let us think that what is done in this matter will be of no avail. It is a very important matter, and a step which once taken will exert an influence beyond what we can imagine.

Mr. CLAMSTED—I move this Association recommend that a committee of civil engineers be appointed by the railroad companies to investigate this matter of the gauge of roads.

Mr. HILDRUP—I second that motion. The Pennsylvania Railroad have their tracks established. It is no light thing to say to them, "Here, you must change." It is a matter of very great difficulty, but time will accomplish that, if there is a necessity for it. Now, the frequent occasion they have to reject cars from the various other roads interchanging with them makes a perpetual annoyance. Now, who is right? The ordinary track is 4 feet 8½ inches. The Pennsylvania Railroad track is an exception brought about by their necessities. The beginning point certainly must be a harmonizing of the different tracks. That is outside the control of this department. It is ent rely in the hands of the engineers of the various railroads, and a recommendation from this Association, asking them to begin at the beginning point, seems to me eminently wise and the most fitting thing we can do. Another thing, I heard a remark that this Association was without power. Laws are not powers. Laws simply put in form the prevailing ideas, and before you can get amendment, or improvement, or modification, you must have the idea preceding it. You must have the conviction of intelligent men that a certain thing is right. When you have that legislation follows. Now, I assert that this Association has done more to establish right ideas in reference to railroad equipment than any and all other influences. It has intelligent minds brought to bear on all details, the work to be accomplished and the manner of doing it. It has daily and hourly experience. It has the experience of where difficulties are found; of where modifications can be made. It has the great question of to-day before it—of how shall this great country be developed? Competition is the great question of our civilization. It is driving with overwhelming force every interest of the country in conflict one with the other. We have in this department as much of that as in any other interest in the country. All this has got to be perfected for the development of the country and for the greatest productive result in doing so. To-day the question arises, how shall the products of the country be transported? The railroads are not sufficient according to the ideas prevailing. There must be more railroads built or the present ones must be more efficient, and that is the question which comes before us day after day. We take up those questions in all their bearings, and we have determined that the carrying capacity of cars must be increased. That is eminently in our department. How is it to be done? We are said to be without power. Ten years ago a good-sized axle weighed 250 pounds. When a larger axle was recommended it was reluctantly consented to, and the objection was made that our roads would not do it. An axle of 347 pounds to carry 30 tons is in use to-day. That has been the work of this Association. Many of the roads have adopted it. I know one of the largest railroads which is a sufficiency to itself. They have a large and able mechanical department in the hands of intelligent engineers. They are sufficient to themselves and pay little attention to the recommendation of the Association. To-day they have got the standard axle. They are the parties to hold the line the longest, and they are now equipping their road with cars of 30 tons. Now we find this difficulty of trackage. I know the greatest difficulty is sharp flanges. It grows out of the close gauge. Might not this Association call the attention of engineers to the fact that there is a serious and radical error in their trackage? We are right to object to it. We are right to give evidence establishing it. Let them meet their own body, and let us get to remedy that difficulty which precedes ours. When they have remedied theirs, ours is easily remedied, and the recommendation of this Association to them, I think, will have the very best effect.

Mr. WILKES made some remarks that were inaudible.

Mr. HILDRUP—I think that the gentlemen are mis-



taken in regard to the number of cars we interchange with the Pennsylvania railroad. I see thousands and thousands of their cars. I don't think 't at that stands in the way of this Association saying what they think is a proper trackage. It is not in my judgment a thing we need hesitate about, because some great or small railroad has a different view. I think it is our duty to use our own judgment. Gentlemen say that the Pennsylvania road rejects their cars. Now let this Association say what is the proper trackage and don't you think it would be a hindrance on the Pennsylvania rejecting their cars? Don't you suppose they would be a little more reluctant about saying they won't take a car? Don't you think it may possibly come into their minds that they may be in error?

Mr. L. GAREY—There is one settled fact, which is, that cars are interchangeable between the roads of various gauges from 4 feet 8½ inches to 4 feet 9 inches. Now, that being the fact, it is evident to each one of us that it will continue to be so, and that it will increase year by year. If such is the fact, should there not be a gauge which would be a standard gauge, to which wheels should be pressed that would be suitable for all these gauges, or at least for the largest trackage of a single gauge, that single gauge being 4 feet 8½ inches, and should they not have the power to say our wheels shall be set at a certain gauge? If the other roads cannot use cars of that gauge, which is of a distance making it the most economical for the largest number of roads, will they decline to do the business, or will they come to the gauge of 4 ft. 8½? It is evident to me that this question is one vitally important to the entire country—of more importance than most of you gentlemen imagine. Roads despatching 124 trains within 24 hours, if not able under the circumstances in which they are placed by having the tight gauge, of moving from six to eight cars more in a train, what does it amount to? It requires at least that per centage more of trains and locomotives to do the business, to say nothing about extra fuel and the extra wear and tear upon the track. Now, I think a committee of Master Car-Builders should be appointed, who should sift this matter to the bottom, and in connection with any other committee that they can get appointed by the railroad companies during the coming year, to establish a gauge which shall be right, and which will be acknowledged by all railroad men as being just what we want; and I am satisfied that there is more money to the railroad companies in having this thing settled just now, than in almost any other thing. We can all see looming up in the near future, cars that will be carrying 20 tons at least. We can see in the near future almost a complete revolution in the manner of handling the freight of this country. If we take the past, and judge the future by it, it must be done. The present terminal facilities and rolling-stock will not answer the requirements. It is necessary to double up the capacity of our roads, and at the present time it is difficult to store idle cars at various times during the year with our present stock. If we double the capacity of our cars, we double our rolling-stock in the car department at once. And it is just as sure to come to pass as railroads are sure to be operated.

Mr. KIRBY—I would like to say a few words on this gauge question which, perhaps, will be interesting. I will take this diagram of Mr. Adams' to illustrate what I have to say. When the Lake Shore & Michigan Southern narrowed their gauge between Toledo and Buffalo from 4.9 to 4.8½, they laid it with new steel rails. The new rails were of different form entirely from the old iron rails. The old iron rails were very much rounded on the top, and it just suited the root of the flange of the old car wheels. The new steel rail as most of you are aware, is flat on the top and has sharp corners. We found we could not have near as many cars in a train after we narrowed the gauge as before. Consequently, the Civil Engineer and General Superintendent gave orders to reduce the gauge of our wheels to 4 ft. 7½ in., and, in consequence of that and some other things, the tonnage of our trains has increased from 180 to 231 tons per train. That, you see, is a difference of about five cars in a train.

Mr. VEBRYCK—I would like to ask Mr. Kirby whether there are not different forms of steel rails.

Mr. KIRBY—I have never seen any of a different form.

Mr. WIEBS—I would add to the motion that a committee of Master Car-Builders be appointed to confer with the committee of Civil Engineers.

The amendment was agreed to.

Mr. DAVENPORT—I move that in the judgment of this Association, three-quarters of an inch has

been demonstrated to be the most economical in operating on the 4.8½ gauge.

Mr. FORD—Why is that any better on the 4.8½ than on the 4.9?

The motion was agreed to.

#### PLACE OF NEXT ANNUAL MEETING.

The committee on the subject reported that the next annual meeting of the Association be held in the City of New York. Report agreed to.

Mr. ORTTON, of the Committee on Correspondence, read letters from the Pullman Palace Car Company, Messrs. Buhl, Ducharme & Co., and the Detroit Free Press Company, inviting the members of the Association to visit their respective establishments. The invitations were accepted with thanks.

Mr. HOPKINS moved the adoption of the following resolution, which was agreed to:

Resolved, That a committee be appointed by the President to gather and present to this Association at its next annual meeting, such facts, not involved in the duties of other committees, as, in its judgment, will be of service in promoting the objects of this Association.

#### MATERIAL FOR BRAKE SHOES.

The President—I have a question here: What is the best material for brake shoes? You remember that at our last meeting, the members of the Association were requested to make tests of the qualities of different materials for brake shoes. How many have attended to their duty in that respect?

Mr. VARNEY—I think the Congdon shoe is the most economical. I say further that it will wear 3½ to 1 of common cast-iron shoes.

Mr. COULTER—Since our last convention I applied one set of Congdon shoes against the common cast-iron shoes. I have a very accurate record of the weights at the time they were put on, the number of miles run, the number of stops made, and the weights when taken off. I did not think I would need to use those figures, so I did not bring them along. My experience is that a Congdon shoe will wear out four sets of common shoes.

The President—Has any one made any tests of brake shoe materials during the last year?

Mr. ADAMS—It seems to me that the parties speaking thus far entirely misunderstand the object of the Committee. I got the impression that the committee was appointed to ascertain, if possible, what was the difference in the retarding power of the different qualities of material used for brake shoes, as well as the wearing qualities. I believe it was generally conceded that the Congdon shoe wore the longest, but the question arose last year and was discussed quite extensively. It was pointed out that the idea was not to find out which had the greatest wearing qualities, but which had the greatest retarding power; and that was a question which was not decided at all. A committee was appointed, and each and every member was requested, if possible, to make such experiments as they might, in their judgment, think best to find out which of the kinds of material used for brake shoes had the most retarding power and was most durable. Mr. Varney says, in his judgment, the Congdon shoe lasts the longest. Everybody knows that; but it is not proved at all that that is the most economical. I would like to hear if anybody has made any experiments to see which has the greatest retarding power.

Mr. COULTER—I have made no tests as regards the retarding power, but I kept a very accurate account of the expense. I found that there was a large percentage in favor of the Congdon shoe.

Mr. ORTTON—I don't think it is a question at all of dollars and cents. The objects of the trials I made last year was to find out the abrasive qualities of the metal. The way I place it is this: If there is a drawback open, or if there is a collision likely to take place, I want to prevent it. I want to be able to stop the train with the greatest amount of ease; and the object was to find out which was the best kind of metal. You might take a piece of case-hardened steel, and that might last a good deal longer than the Congdon shoe; but its usefulness would not be very great. My experiments proved that the cast-iron shoe was the better abrasive material, as compared with the Congdon shoe. I think what was understood last year to be the question was, what is the abrasive quality of the metal? Mr. Hayes, of the Illinois Central, made a number of experiments on his road, and he claims that wrought-iron is better than the Congdon. His road uses the plain wrought-iron shoe. A good many members professed last year that they were going into this thing scientifically.

Mr. GORMAN—I have had a little experience in the retarding qualities of the metals. I suppose it is best to say that I have tried it on switching. I

wore out three sets of cast-iron shoes, and then put on the wrought-iron set in their place; and those wrought-iron shoes wore out three other sets of cast-iron; and in trying the retarding qualities of it, I would apply the brake, at the same time leaving the throttle open on the engine, and the cast-iron would not hold it. But when we used the wrought-iron, we found it would hold it. The wrought-iron shoe will wear out, in my judgment, over four sets of cast-iron. I know that it will hold the engine when the cast-iron will not.

Mr. VARNEY—We used to run the cast-iron on our passenger cars, and we used the We-tin-house brake, and I never heard any complaint about their not making their stops just as readily since they have the Congdon shoe.

Mr. AYLESBURY—We have made some experiments with the Congdon shoe. We put four under a mail car, and four under a baggage car which was sent us from Chicago, putting a Congdon shoe and a cast-iron shoe on the same brake-beam, one on the mail car and one on the baggage car. The baggage car ran 14,800 miles. We did not keep an account of the stops. The cast-iron shoe was 1½ inches thick when it was put on; after running that distance the average thickness of the shoes was half an inch. The Congdon shoes, I think, of the same thickness as the cast-iron when it was put on. The average thickness of the Congdon shoe at the end of the trial was an inch and a half. That was equal to 3 to 1. That was a mail car hauled next to the engine. The baggage car was next to that. It ran 33,400 miles, and the difference in favor of the Congdon shoe was just an eighth of an inch. The average thickness of the cast-iron shoe, after running that distance was ½ inch, and the thickness of the Congdon shoe was 1½ inches. Now, whether it was that the mail car was next to the engine and there was more pressure on the trucks, I am not prepared to say.

Mr. ORTTON—As an illustration of what I meant I would say, that at one time I was in the habit of walking on flags. I found that my shoes wore out very fast. In Canada we walk on wooden sidewalks, and my boots last much longer. If I was walking upon an ice surface, I suppose it would take a long time to wear out my shoes; but what would I accomplish? If I tried to trundle a wheelbarrow up an incline, I do not think I could accomplish much with it. If I had a firmer hold I could move the barrow up the grade. What I want to say is, that there is a difference in the retarding power. If you apply one description of metal on a wheel you will find that it will last a long time, but it is doing very little work; while, on the contrary, the other metal is wearing very fast and is doing well, because its abrasive qualities are so much greater. I believe, however, that the Congdon shoe is a very good one. I have had very little experience with that shoe except the experiments I made last year. The tests were carefully made, so that the result was absolutely correct. I say, let the best shoe stand upon its own merits. I supposed that our members, knowing the importance of the matter, would have brought something before us this year.

Mr. C. E. GAREY—I was under the impression that each car-builder was to make some tests to try to discover what was the best material for brake shoes, taking all things into account. Unfortunately for myself, being laid up for the greater part of the year, I was not able to get at this matter as early as I wished, and, consequently, have not been able to bring the thing to so fine a point as I desired. In order to make these tests, not having a lathe large enough to swing a pair of wheels on and run them as Mr. Orton did, I fitted up a pair of wheels with a standard axle, with a pulley on the axle, also fitting a pulley on the shaft, giving me four speeds of 12, 25, 35 and 45 miles per hour. In order to be sure that there would be no mistake, I made my experiments between 12 and 1 o'clock and after 6 o'clock, so as to be sure about the power. I had my engineer time his engine, running it at 60 revolutions a minute. I am free to confess that I was disappointed in the results. As you are well aware, I am what is called a wrought-iron man. That is to say, I am in favor of wrought-iron instead of cast-iron in almost any place in which it can put. But not to detain you further I will give you some of the figures.

[These figures will be published hereafter.] I hope that my friend Mr. Orton won't stop with his test, and be satisfied. I am not satisfied yet. I hope many other members of this Association will take the time and trouble, and I think their companies can afford the expense to find out which is the best material for brake shoes.

Mr. ORTTON—I think Mr. Garey deserves great credit for the experiments he has made. I would



like to explain for Mr. Garey's satisfaction, one reason why there is so little difference between his wet applications and his dry ones. It is understood that a dry wheel, or a dry rail is in the best condition for pulling. But if you have a little sprinkling of rain on the wheel it is the worst thing you can have. But a thoroughly wet rail is just as good as a dry one. I think if he just sprinkled the wheel he would find the drawing capacity would be reduced one-third.

Mr. FORD—These experiments, it seems to me, are very interesting. But still there is one point which I think is not fully satisfactory, and that is the test between these shoes made of cast and wrought-iron and the Congdon shoe. If I understand Mr. Garey right, he admits that the Congdon shoe did not wear down to the wrought-iron. In that respect it would not seem to be hardly a fair test of the Congdon shoe giving it an equal chance to show its full power. A point brought out by my friend over there in his tests made of cast-iron and Congdon shoes—he spoke of one pair of cast-iron shoes that held out nearly as well as the Congdon shoes. It seems to me that he brings out a point which ought not to be lost sight of in the use of the cast-iron shoe. I believe that it is to be accounted for in the quality of metal used in those shoes. If we can make a set of cast-iron shoes of pot-metal, it is quite a different thing from a set made of soft new pig-iron, and there might be also a great deal of difference in the adhesive quality of the two sets of shoes. We have men here who are familiar with the character of iron-foundry men; and I would like to hear from them.

Mr. C. E. GAREY—That is all first-rate. I like to hear that; but at the same time it is just as fair for one of these shoes as for another. I was well aware that my wheels were not running under a train; but the weight of my wheels was the load that I was carrying. The application is equal to all classes of shoes. The only idea I had was to find out what would hold the wheels the best at a certain rate of speed, and I would say that I have some other kinds of metal, which came in a little too late for my experiments this time. I hope to have them next year.

Mr. AYLESBURY—We get our shoes all at the same foundry and they were supposed to be about the same; and the only way of accounting for it was that the mail-car was close to the engine and received the brake first. I only mention this fact to show, where you are making a test of a shoe, you may get it on one car and have very satisfactory results, and you may get it on another and there are no results at all.

Mr. KIRBY—Two of the gentlemen have made experiments in three different kinds of metals in one way. I have made experiments in another way. I took the one of our baggage-cars running between Joliet and Chicago, which made the trip every day. The test was made with Congdon cast-iron and wrought-iron brake-shoes. They were not put on all at once, but succeeded each other. The results were as follows:

4 Congdon, each made.....	1,485 steps.
4 Wrought-iron, each made.....	9,247 "
4 Cast-iron.....	609 "
4 Congdon, when put in weighed.....	60 "
Cost at 4c. per lb. when removed.....	\$2.40 "
Value of scrap.....	27 "
4 Wrought-iron, when put in weighed.....	25 "
Cost at 2c. per lb. when removed.....	\$1.04 "
Value of scrap.....	25 "
4 Cast-iron when put in weighed.....	604 "
Cost at 2c. per lb. when removed.....	\$1.21 "
Value of scrap.....	25 "

Mr. HOPKINS—I think there is one point in this matter of the tests of brake shoes, that apparently has received no attention at all, and that is the question of the destruction of the tread of the wheel. I have made experiments in another way. I am thoroughly convinced that the wrought-iron shoe does tear the wheel much more than the cast-iron.

Mr. KIRBY—The tests were made on the same line. There was no difference in the face of the wheels.

Mr. C. E. GAREY—The same point that Mr. Hopkins raises was covered by experiments made on our road some two or three years ago. All the wheels on the car were literally worn out. In that test, which is reported in one of our annual reports, I wore out 12 sets of cast-iron shoes; that is, I wore them out so that they cracked. I took pains to procure those shoes from three different foundries. I found a variation of seven days in the wear of the shoes from the different places. The greatest wear that I could get was about 18 or 19 days' service out of a set of 100-iron shoes. But when the wheels were taken out I could discover no ma-

terial difference in their wear. They were all worn out entirely. All made the same stops and mileage, and were under the same car. But for all that, I am not yet satisfied that wrought-iron is the best material for brake shoes. I want every gentleman of this Association to know for himself what is best.

Mr. ORTTON—Mr. Garey has used the same amount of bearing service while he has been applying a very small weight. He has put on from 200 to 500 pounds in weight. If he could so arrange it that on the same bearing surface he could get a weight of 4,000 or 5,000 pounds it would be more satisfactory. If you take a brake shoe and merely stand upon it with your own weight, it is very different from putting on 4,000 or 5,000 pounds. The abrasive quality is not decided under the conditions. The method that is adopted in running the speed is all right; because in that case he would get the difference of temperature in his metals, but for want of wearing the surface proportionately, he does not get the same difference even in the cases of temperature, which acts considerably on the wear and tear of the ordinary brake shoe. It would certainly be to the advantage of all railroads to use the wrought-iron in preference to cast-iron, if the results are as Mr. Garey states them. My idea last year was that we should ascertain facts, and I am very glad to see that two or three members have been industrious during the past year. I can suggest another method by which they can get the adhesive quality of the different metals that is laid down in many of our text books. Take a metal slab 5 or six feet long, and cut off a series of pieces of different kinds of metals, and slide them down. Gently raise one end of the slab by means of a screw, until the metal starts and slides, and if you do that you will find that it is never variable with the same materials. I am very glad to find that the Congdon shoe is a good thing.

Mr. MILLER—I cannot enlighten you on any tests. I can only speak in regard to what it cost the Michigan Central in 1879, compared with 1877. We made a saving of over \$5,000 in metal last year, by using the Congdon shoe, over 1877, when we used the cast-iron shoe.

#### CONTINUOUS DRAW-BARS.

The President: I would call your attention to the matter, and request that you spend a little time in examining the inventions which are exhibited here, and in talking with the men who present them. It is due to them for going to some expense in getting their inventions before us. I have also a question: *What has been the experience of members during the past year in repairing cars equipped with the continuous draw-bar?*

Mr. VARNEY—I will say for one that I have seen but two cars with the continuous draw-bar that I had to repair. One was a foreign car, and one was our own. In one of them was a flaw in the key-hole and that was broken. The draw-bar in the foreign car was broken in the same way.

Mr. ORTTON—I believe the principle of the continuous draw-bar is a good one, and the bad experience we have had in connection with it is simply from bad workmanship. I think if some attention was given to the cut-off holes it would be a step in the right direction. We are pulling, as it were, from the rear end of the car; but it is not so; we are pulling from the rear end of the rear car. If you divide the draw-bar into loops, then there is a better effect produced. You get a certain amount of slack; but that is also rather a disadvantage than otherwise, inasmuch as it multiplies the number of key-holes, and these become a trouble to us. The principle of the action of the draw-bar is being very much damaged, I think, by the way in which they have been manufactured.

Mr. VERREYCK—I have had considerable experience with the continuous draw-bar, and I find the difficulty is what Mr. Orton mentions—about manufacture. I have my holes punched, as he recommends, and I use steel keys.

Mr. ADAMS—Is it the general impression of the Association that the continuous draw-bar is a splendid thing? I think it is one of the most troublesome things that was ever invented.

Mr. ORTTON—I think Mr. Adams should explain his reasons for holding that opinion. If there is bad manufacture, that does not destroy the principle of a good thing. If we make continuous draw-bars with a loop in the center, and if we have the key-holes made with rounded ends instead of square, a great deal of the trouble disappears.

Mr. ADAMS—We have not any of them on our line, but I have heard that there were, perhaps, 8,000 or 10,000 supplied this year with them, and we have had our proportion of them. I have

not kept a record of them. They are constantly breaking, from what cause I am unable to say; and when they break it subjects us to a good deal of labor to repair them. Every one knows well enough that you cannot get one of them repaired, with two or three men, in less than half a day. We have had to chain a car to the track and hitch an engine to it to get the draw-bar out. Some of them are tight and stretch three or four inches, and others will break off.

Mr. ORTTON—A great many of these draw-bars have been running over our road, and I don't think a dozen of them have required repairs. But I agree with Mr. Adams, that when they do require repairs it is hard to get them out. We all know that when a train runs off the track there is a great deal of trouble, but people say they should not run off the track. I say the same with respect to the draw-bars. It should be properly made, and then it would not often get out of order. I believe that what we are really here to do is to decide as to the soundness of the principle. Take the old style. What are you pulling from? You are pulling from a couple of sticks, sometimes three. If you punch up against them you send them a little one way, and when you pull them you draw them the other way, and the consequence is that they soon break. I consider that the continuous draw-bar is better in practice and in principle than the old style.

Mr. CAMPBELL—I am thankful, with Mr. Adams, that we have no continuous draw-bars on our road. The other day we had one come into the yard, and it was doubled up. We could do nothing with it, until we got the switch-engine around, and pulled it out. It cost three times the amount to fix up that the ordinary draw-bar does. That there are so many thousands of cars with the old coupling, and so few yet with this continuous draw-bar, I think tells very hard for the latter. It is a nuisance, and we have found it so. I wish they would send them on the Canada Southern Road, for we don't want any of them.

Mr. MILLHAM—On our road we have not adopted or used it. My experience is the same as that of Mr. Adams, and my friend there on the left (Mr. Campbell).

Mr. YOUNG—In our repairing yard, where the light repairs are done on cars that run through, I have a daily report from the repairer sent to my office. The average number of cars passing through his hands would be perhaps thirty a day. In almost every car the repairs done are principally on jaw-bolts, etc., while but two for the last six months have been repaired as continuous draw-bars in bad order, and those were owing to bad construction. Cars are much better handled with the continuous draw-bar. I would be very glad if they would send all the continuous draw-bars over the Bee Line.

Mr. GAREY—My experience with the continuous draw-bar has not been so large, perhaps, as that of others, but the principle, to my mind, is right. The workmanship and material in many cases, I am well satisfied, are wrong. The New York Central road repairs on an average during every thirty days in its shops over 8,000 cars, and the average number repaired for damaged draw-bars is from one-third to one-half the whole number each month. It is one of the biggest items in car repairs we have. In putting them on at first, we tried a pipe instead of a rod—a two-inch steam pipe. We found, on trial, that the pipe would stretch in handling our heavy trains. We have abandoned the use of pipe, and are now using rod. I have yet to learn that we have had any great difficulty with the continuous draw-bar compared with the number in use. I should say that the breakage of ordinary draw-bars as compared with the continuous draw-bar, is one hundred to one, at least.

Mr. ORTTON—I would like to ask Mr. Campbell how the draw-bars get doubled up. There is a spring at each end, and if you bump both ends together, I fail to see, unless the body of the car gives way, how the draw-bar gets doubled up.

Mr. CAMPBELL—I would say, for the information of Mr. Orton, that they bent in such a way that you could not get them out. We had to take a switch-engine to pull out the bar. The end of the bolt was broken off. It might be owing to the draught-iron shoving in.

Mr. ORTTON—The draw-bar rod is provided with a spring, and if the spring is in operation, I do not see how the bar is to get bent up. I know for the last six months we have not had more than six of these draw-bars that have given us any trouble.

Mr. CAMPBELL—We have two or three every month.

Mr. AYLESBURY—We have had some experience with these draw-bars. Mr. Orton wants to know



how they got doubled up. In some of the cars there are two pieces bolted in between the two timbers, and when there is a collision the two center pieces are driven out. If the two draught timbers are solid, and there is a coupling in between to give a little play in case they come together, I don't think they will double up. We had a car constructed with two pieces bolted in between the two draught-timbers, and when the cars came together these pieces would drive out, and the bar would double up.

Mr. S. A. DAVIS—I would like to ask if there are not 100 cars equipped with the old style of draw-bars to one equipped with the continuous draw-bar? My experience is that it is not with the cars that have been built within a year or two that we have trouble, but with cars that were built years past. It is with the cars that have been made five, ten or fifteen years that we have the trouble.

Mr. ADAMS—I am glad to see the members so ready to express their opinions on this matter. I do not think there is so large a percentage of our members in favor of continuous draw-bars as was supposed. I confess that at first I was greatly taken with them. Some of our officers were strongly in favor of adopting it. Mr. Campbell speaks of the immense labor required in repairing it. Mr. Garey says that he thinks the larger percentage of accidents is with the draw-bars of the other kind. It is just as Mr. Davis says, that the repairs on draw-bars are principally on our old cars that have got weak. But you take the new cars which have been built within the last few years, and you will find no breakage on draw-bars. I will venture to say that we have not 400 cars within the last two years in service, and I do not believe there is one draw-bar broken. I pledged myself to Mr. Garey yesterday that if he would adopt a certain kind of draw-bars and the Lake Shore would do it too, the Boston & Albany would adopt it. We wanted to adopt something which would be uniform, but I would not pledge myself to do it if it is a continuous draw-bar.

Mr. C. E. GAREY—We have a few continuous draw-bars on our division, and none that we manufactured at our shops get broken.

Mr. FORD—I was waiting very patiently to hear Mr. Campbell, or Mr. Adams, or Mr. Mileham tell us something about the principle. It is only with reference to the manufacture that they speak. I acknowledge that the first few we put on our road we had trouble with, the iron being bad, and we had once to put on an engine to get the bar out; but since that we have them made properly, the key-holes punched properly, and we have had no broken ones. Out of the 2,200 cars that during the last few weeks we have taken out for the purpose of making little repairs, not general repairs, over half have been for defective draught arrangement. A good many of the continuous draw-bars running over the P. C. & St. L. road, belong to other roads west of us, and we have had but one of those draw-bars with which there has been any trouble in repairing, and that was in a collision and if it had been the ordinary draw-bar it would have demolished both of them. As it was, it demolished one end and crippled the long rod. Aside from that, we have very little expense or trouble. Where we have had trouble it has been from defective work and not from a wrong principle, as I contend. It is very seldom that we see any device perfect in the first place. Improvements are made and there have been improvements in the continuous draw-bar. I have suggested the making of a long link which should reach nearly from one cross-tie to the other, so that in case of a collision, or in case the timbers were not under the car, so that it would cripple the long rod, it would have an opportunity of sliding under the car. It gives an opportunity of putting a spring in the centre, which makes it an elastic rod. When we consider that over half the cars that come in for repairs have been owing to draught arrangements, it seems to me it is a very serious matter as to whether some improvement cannot be made in construction.

Mr. RAYMOND—I would say that exactly: the device which Mr. Ford describes was used certainly more than twenty years ago on the Baltimore & Ohio road, and the same thing is in use to-day.

Mr. FORD—I know very well what the old B. & O. draw-bar was. It did not have a long link in the center, it was a continuous rod. To-day that rod has adopted a continuous draw-bar with a link in the center.

AN ASSOCIATE MEMBER.

Mr. Albert F. Hill, Civil Engineer, was elected an Associate Member of the Association.

ELECTION OF OFFICERS.

The committee to nominate officers for the ensu-

ing year, made a report, recommending that the present officers be continued, which was agreed to. The President and Secretary thanked the convention for this renewed expression of confidence, when a vote of thanks was moved and given them for their services.

The following resolutions were adopted:  
Resolved, That the thanks of the Association be returned to Judge Chipman, the citizens of Detroit and other friends, for the generous welcome and kindly hospitality tendered during our visit to their city.

Resolved, That the thanks of the Association be returned to President Wagner, of the New York Central Sleeping-Car Company, for kindly placing at the disposal of the eastern delegates the sleeping car "City of Rochester."

The Convention then adjourned to meet in the City of New York on the second Tuesday in June, 1881.

A St. Louis man has patented a new cattle-car. The peculiarities of the invention consist in placing the stock in four ranks lengthwise the car. The ranks in each end of the car stand facing each other, and a combination water-tank, trough, and hay-box extends crosswise the car and under the heads of the cattle. Chains or belting fastened to the floor pass up between the stock and are attached to a shaft overhead, which being turned, draw them tight and hold each animal in place. Water and feed is carried for a trip of four days, and stock can eat, drink, lie down and rest without the train stopping. Reversing the shafts, the stays fall off and drop down. The water-tank is on a roller, and can be easily moved to the end of the car. The car is then ready for any kind of freight.

PLUMB, BIRDICK & BARNARD, of Buffalo, N. Y., have just set up bolt-forging machines at the works of the Singer Manufacturing Co., at the pump works of W. & B. Douglas, and at the shops of the Richmond & Danville Railroad, in Richmond, Va.

The car shops of Osgood Bradley, at Worcester, Mass., are engaged in building ten first-class passenger cars for the Eastern Railroad. Three of them were recently run out from the shop and three more are nearly completed.

Mr. W. W. WILCOX, from 1865 to 1875 Master Car-builder of the Chicago, Burlington & Quincy Railroad, died at his residence in Aurora, Ill., May 12, aged 69 years. Mr. Wilcox was a native of Connecticut, but spent most of his active life in Detroit, where he was a leading builder, and held many positions in the city government.

YARD MASTERS' MUTUAL BENEFIT ASSOCIATION.—At the annual convention in Boston, June 9, the following officers were chosen: President, George W. Evans, Denver, Col.; Vice-Presidents, James A. Washburne, Concord, N. H., and Edwin Adams, Hannibal, Mo.; Secretary and Treasurer, Joseph Fanger, Indianapolis.

When Jim Fisk introduced the word "railway" to current American speech, few lines in this country used the term. At present, out of 1,147 names of companies in Poor's Manual, 185 are "railways" and 962 "railroads." The former term is largely used as a convenient synonym in reorganizing old roads. The Chicago, Rock Island & Pacific Railroad has, for instance, just become the Chicago, Rock Island & Pacific Railway.

An old lady in Pennsylvania had a great aversion to rye, and never could eat it in any form. "Till of late," said she, "they have got to making it into whisky, and I find that I can now and then worry down a little."

A RECIPES for making chicken-soup in restaurants: Hang up the carcass of an old hen or rooster in the sun, so that its shadow will fall in a pot of boiling water. This will do in sunny weather, but on cloudy days the soup is apt to be weak.

An old lady was admiring the beautiful picture called "Saved." "It's no wonder," said she, "that the poor child fainted after pulling that great dog out of the water."



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#### EDITORIAL ANNOUNCEMENTS.

Subscription.—ONE DOLLAR a year in advance, postage prepaid. One copy will be sent free for one year to any person sending us five new subscribers.

Addresses.—Business letters should be addressed, and drafts and money orders made payable, to THE NATIONAL CAR-BUILDER. Communications for the attention of the Editor should be addressed EDITOR NATIONAL CAR-BUILDER.

Advertisements.—Nothing will be inserted in this journal for pay, EXCEPT IN THE ADVERTISING COLUMNS. The editorial department will contain our own views and opinions; and the rest of the reading matter, aside from advertisements, will be such as we consider of interest to our readers.

Contributions.—Articles relating to railway rolling stock construction and management, and kindred topics, by those who are practically acquainted with these subjects, are especially desired. Also early notice of changes in railroad offices, organizations and names of companies.

Special Notice.—As the CAR-BUILDER is printed and ready for mailing on the last day of the month, advertisements, correspondence, etc., intended for insertion, must be received not later than the 25th day of the month.

SUBSCRIPTIONS to the CAR-BUILDER will be received, and copies kept for sale, at the following places:

A. WILLIAMS & Co., 283 Washington Street, Boston, Mass.  
L. SCHAFFNER, Cigar and News Dealer, Grand Pacific Hotel, Chicago, Ill.  
WILLIE H. GRAY, 306 Olive Street, St. Louis, Mo.  
ROBERT CLARKE & Co., 65 West Fourth Street, Cincinnati, Ohio.

In order to make room for the proceedings of the Car-Builders' Convention, we have been compelled to leave out of our present issue a portion of the Directory of Railroads, Superintendents, etc.

#### THE CAR-BUILDERS' CONVENTION AT DETROIT.

Considering the length of time the Car-Builders' Association has been organized, the magnitude of the interests it represents, and the number of annual meetings that have been held, the meeting at Detroit was not in all respects what it should have been. As to the number of members in attendance, and the committee work performed during the year as shown in the reports presented, it fell short of what might reasonably have been expected. There were in all, sixty members of the Association present, but this number was not at any one time in the chamber during the sessions. Taking into account the actual membership, and the accessibility of the place of meeting, there should have been twice as many at the convention, after making due allowance for unavoidable detention on account of sickness, business, or other causes. As to the committees, it should be remembered that nearly all of them are standing committees, continued from year to year and having in charge substantially the same subjects. Aside from the report of the Dictionary Committee, which was a more formal announcement of the completion of its work, there were but three re-



ports made by standing committees, and all of them very brief. The one on freight train brakes states that inventors were hard at work on the problem, and that definite results might be looked for in the near future. The report on steel and iron in car construction deals mostly in generalities, which is perhaps all the committee could be expected to do in view of the small progress that has been made in the way of introducing metallic cars in this country. The report on the diameter of car wheels gives the results as to 33 and 42-inch wheels on two leading roads, the opinion of the committee being in favor of the larger size. From the five other committees on the regular list, no reports were forthcoming.

The discussions, however, were interesting and animated, and embraced a variety of topics relating to car-construction, economy and management. It should, nevertheless, be borne in mind that the committees are the working machinery of the Association. They are appointed to gather information and to digest and arrange it for presentation at the annual meetings. If this is not well and thoroughly done, the collective body, when it assembles, can do little but "interchange ideas," get at facts and conclusions in that way as best it can, and then continue the committees another year. This routine will do well enough for a time, but it should not be worn into a rut. There must be some way of *getting in the work*, and there is no other way that we know of but to face the thing squarely and do it. This may savor a little of fault-finding; but, as impartial observers, we feel that we shall best serve the true interests of the Association by pointing out its obvious defects. Much, we are aware, might be said in extenuation of the feeble work done by the committees. We will not enumerate the obstacles which lie in the way, and with which every member who has served on the committees is familiar. No amount of extenuation, however, will alter the facts, and it is these which must ultimately be dealt with.

That a movement should have been made to increase the efficiency of the Association is not to be wondered at. A considerable portion of the first and second days' sessions was occupied in discussing propositions to secure this end, one of which was that the railroad companies should be solicited for contributions in aid of the Association; another was that a statement should be made to the managers, setting forth the objects of the Association; and others proposing that railroads be requested to send representatives to the annual conventions; that others besides car-builders be admitted as members; and that railroad companies be solicited to become such. After a prolonged discussion, which developed much conflict of opinion, the whole subject was laid on the table. We give in our report a very full abstract of what was said on these propositions. It strikes us that the members of the Association who have participated in its labors during the fourteen years of its existence are, or at least ought to be, the best judges of its capacity, and as to whether its efficiency is likely to be increased by the active co-operation of managers and superintendents as a working power in the organization.

This plan has been vaguely talked about for years, but has resulted in nothing, for the reason that to carry it into effect would practically destroy the identity and distinctive character of the Association. Propositions to increase its efficiency are well enough provided they are practicable, but they should not be looked upon as implying that it is or has been altogether inefficient. The truth is that it has accomplished far more than appears on the surface. It has been a great stimulus to inventors. The manufacturers of railway supplies of various kinds have improved their pro-

ducts immensely through the influence of the yearly and monthly meetings. The matter of a freight train brake, although the subject goes over at every meeting, is not where it was four years ago—an apparently visionary, impracticable thing—and all because the subject has been agitated by the Car-Builders' Association. The great improvement in wheel service is largely due to the same source, not to mention other things. Because the money-saving to railroads resulting indirectly from these yearly and monthly discussions cannot be accurately estimated in figures, it does not by any means follow that these gentlemen have all this while been talking in the air, and giving to their June conventions only a thin disguise of business.

We very much doubt whether the members of the Association themselves appreciate the actual benefit that has resulted to railroads from what it has said and done since its first meeting. Be this benefit more or less, however, the Association cannot live and thrive on its past record alone. Its members are students in a seminary from which they will never be ready to graduate. Their education has a beginning, but it is never finished. The sphere of their duties is one of constant expansion and development. A mechanical appliance not thought of yesterday is a favorite to-day and consigned to the scrap-heap tomorrow, to be superseded by something newer and better. There is, and will be, a never-ceasing demand for greater safety to passengers and train men, cheaper transportation, a more economical use of material, less wear and tear, less diversity in construction, better brakes, wheels, couplers, etc.

The discussion of plans to increase the efficiency of the Association is not untimely, and will be productive of good. Although it led to no definite action, it will not die out in the minds of members. The more they think about it, the more fully will they realize the fact that the well-being of the Association requires that it shall set up to the full measure of its capabilities; that it shall be a self-sustaining and independent organization, soliciting no gratuities and seeking no amalgamation with other departments which do not court the alliance.

#### A New Directors' Car.

A new special car has recently been completed at the Allston shops of the Boston & Albany Railroad Company. It was built under the supervision of Mr. F. D. Adams, the Master Car-Builder, and in accordance with the special directions of the General Manager of the road, for whose use it is mainly designed. The car has been inspected by a number of railroad officials, and is said to be the finest one of the kind in the country. In its general appearance, both inside and outside, it is devoid of showy ornamentation, but at the same time the finish is rich, and the arrangement such as to promote the convenience and comfort of the occupants. The exterior is painted an olive color, with little ornamental detail save a gold stripe running around each panel, and the name of the road in plain letters on the letter-board—the general style resembling that of the New York & Boston drawing-room cars.

The length of the car, over all, is 70 feet, and 61 feet in the body, with round corners of large radius. The entire inside finish is in mahogany, highly polished. Not a nail, screw or joint is visible. At each end is an observation room 12 feet in length; and instead of the open ends, as is usual in directors' cars, they are enclosed with large plate and bent glass. A modern roll-top mahogany desk occupies a corner in one of these rooms, the rest of the furniture consisting of large easy chairs. Next comes a space of 4 ft. 6 in., occupied on one side of the passage-way by the heater, and on the other by the toilet room con-

taining an elegant plate glass mirror, set-beds, and other necessary conveniences. In the center of the car is a large saloon, to be used as a dining sleeping and drawing-room. In each corner is a cabinet bedstead finished in mahogany. These are folded into a small space in the daytime, and surrounded by heavy rep curtains. A handsome mahogany extension-table stands in the center. The furniture is upholstered in olive leather. The carpet is also of an olive shade and the best Wilton. An invisible trap-door on one side under a sofa, leads to a refrigerator vault large enough to hold provisions for a long journey. Between this central saloon and the other observation room, is a space of 9 feet, occupied on one side by an "Allegretti" refrigerator finished in the style of the car, and over which is the berth of the porter or cook. On the other side is the kitchen, which, with respect to its contents and arrangement, is somewhat of a novelty. At one end is a medium sized Chilton range, over which is the water heater, and above this is a large copper tank for cold water, so that both hot and cold water can be supplied to any part of the car. On one side is the sink, and at the other end a large cabinet reaching from floor to roof, in which is kept the china, glass and silver ware, all of which is of the richest description and marked with the initials of the road. Underneath are drawers, cells, etc., for various uses. The linen closet is near the cook's berth. Electric bells in the kitchen connect with the other compartments. The car windows are of plate glass, 32 x 44 inches, with silk rep curtains, corresponding in color with the car trimmings. There are four silver chandeliers of four lights each, and of an elegant design. The outside railings, brake-wheels and levers are of composition metal, and appear like burnished gold. The trucks are of the M. C. B. pattern, and have six 42-inch paper wheels, with a wheel base of 10 ft. 8 in. The car is equipped with the brakes commonly used on American railroads; besides which, there is an automatic brake, operated by a cord from the interior of the car. No pains, time or expense have been spared in making this car a model, as respects the comfort and convenience of its occupants, in the making of long or short journeys.

The cost of the car is something over \$12,000, and its weight 65,000 pounds.

The resolution of thanks adopted by the car-builders at the close of their convention, for the hospitalities and courtesies extended to them by the business men and citizens of Detroit, was richly merited. The members of the convention, as well as their friends who were present on the occasion, were not only given the freedom of the municipal council chamber and its approaches, but were entertained with a profuseness and cordiality that will not very soon be forgotten by the recipients. The enjoyment of these attentions was much enhanced by the favorable weather which prevailed. The following programme of the entertainments, elegantly printed and accompanied with tasteful silk badges, was distributed among the visitors immediately upon their arrival:

DETROIT, JUNE, 1880.

The within-named business houses of Detroit present their compliments to the members of the Master Car-Builders' Association, and their friends, for Tuesday evening, June 8, moonlight ride on the steamer Victoria. Wednesday afternoon, June 9, excursion and banquet on steamer City of Detroit.

During the entire convention carriages will be at the disposal of all, from 8 a. m. to 9 p. m., upon application to any member of the committee.

Michigan Car Co., Pullman Palace Car Co., Berry Brothers, Detroit Bridge & Iron Works, Griffin Car Wheel Co., Detroit Car Spring Co., Detroit Car Wheel Co., Baugh Steam Forge Co., Pontiac Car Co., Fulton Iron & Engine Works, Dearborn, Fletcher & Co., Michigan Bolt and Nut Works, Russell Wheel & Foundry Co., Michigan Stove Co., Farrand, Williams & Co., Buhl, Ducharme & Co.

Committee.—W. C. Colburn, T. A. Griffin, A. Hooper, T. A. Bissell, J. M. Rogan, J. Taylor.

The efforts of the committee in carrying out the



programme could not have been more successful. The works of the Michigan Car Company, the Michigan Central Railroad shops, and the Pullman Car Works were also visited, special trains and carriages being provided for the purpose.

The Car-Builders' Association may perhaps visit Detroit again one of these days. There is certainly some inducement, aside from the fact that it is central and accessible in a geographical sense.

#### Exhibition of Car Appliances at Detroit.

One of the interesting features of the Car-Builders' Convention, at Detroit, was the exhibition of models and railroad appliances in the City Hall, near the entrances to the Council Chamber, where the sessions of the convention were held. The exhibit comprised a large number of inventions, many of which are already in successful use upon railroads. Among them we note the following:

Verona Spring Washers, assorted sizes, manufactured by Metcalf, Paul & Co., Pittsburg, Pa.

The Detroit Car Seat Spring Co.'s Level-Tempered Seat Springs.

Allen Paper Car Wheels, manufactured at Hudson, N. Y., and at the more extensive works in process of erection at Chicago.

Combined Canvas-Bag Rattan Car Seating, and Flexible Car-Seat Springs, by the Hale & Kilburn Manufacturing Co., Philadelphia.

Wrought Metal Car Wheel, a new invention by Mr. W. H. Paige, of the Wason Car Works, Springfield, Mass.

Van Liew's Self-Operating Grain Car Door.—D. F. Van Liew, Aurora, Ill., has patented a device for Gardner & Co.'s Perforated Car Seats, and Decorated Wood Coverings for passenger cars; 183 Canal street, New York.

Improved Car Seat.—Charles C. Mason, Altoona, Pa.

Robinson's Improved Car Axle-Box.—Manufactured by Robinson Car Box Co., Columbus, Ohio.

Butler's Excelsior Draw-Bar Attachment, Buffer and Spring Footrest.—George Butler, Cincinnati, Ohio.

Detroit Lubricator Manufacturing Co.'s Continuous Feed Lubricating Oil-Cups.

The Chaplin Anti-Friction Car Box.—18 Dey street, New York.

Iron Car Truck; no cast iron in frame except center-plate.—C. H. Kellogg, Buffalo, N. Y.

Bolts and Pipes.—National Bolt and Pipe Machinery Co., Cleveland, Ohio.

Prescott's Door-Hangers for sliding doors.—Prescott Manufacturing Co., Boston, Mass.

The Stevens Combined Screw and Lever Lifting-Jack.—Springer & Brunk, New York.

Steel, Iron and Brass Wire Nails, manufactured by I. P. Nail Company, Cleveland, Ohio.

Ames' Automatic Car-Coupler.

Bolton's Automatic Car-Coupler.

Cowell's Continuous Platform and Automatic Coupling.—R. A. Cowell, Cleveland, Ohio.

Safford's Safety Draw-Bar.—J. B. Safford, Buffalo, N. Y.

The Tallman Stock Car.

The Matthews Car-Coupler.

Hoit's continuous Draw-Bar.

Godley's Continuous Draw-Bar.

Eccleston's Continuous Draw-Bar.

#### The Allen Paper Wheels.

We have received from Mr. A. B. Pullman, Second Vice-President of the Pullman Palace Car Company, Chicago, the following statement of the performance of 12 pairs of 42-inch Allen Paper Wheels under hot test runs running between Chicago and New York:

No.	Mileage.	No.	Mileage.
239	342,051	297	308,453
240	347,024	298	308,453
241	392,784	275	372,000
242	397,759	276	372,000
247	411,114	281	450,176
248	411,114	282	450,176
255	372,000	285	390,475
256	372,000	286	390,475
257	481,083	287	430,005
258	481,083	288	430,005
265	352,044	303	418,346
266	352,044	304	418,346
Total mileage.	5,660,190		
Average mileage per wheel.	308,560 1/2		

These wheels are still in service, and are apparently in good condition. The Company are apply-

ing these wheels to all new cars, and to others as fast as the wheels can be obtained.

We have also received from Mr. Wm. B. Strong, the General Manager of the Atchison, Topeka & Santa Fe Railroad, the following statement of the performance of the Allen Paper Wheels on that road:

"We are using these wheels under one sleeping car, several coaches, one officer's car, and six engines, and their service is very satisfactory. The sleeping car 'Granada,' is the only one under which they have run any length of time, and under this car they have made about 150,000 miles without turning the tires, and will probably make 200,000 before turning is necessary."

"These wheels have been put to the severest test under one of our engines known as 'Uncle Dick,' of the consolidation pattern, and weighing 60 tons. This engine was built expressly for mountain work, and commenced running about the 1st of February 1879 between Trinidad and Willow Springs (now Raton Station) a distance of 23 miles. The grades on this part of the road are very heavy, 13 miles being 180 feet to the mile."

"Pending the completion of the tunnel through Eaton Mountain, the mountain was crossed by a switch-back three miles in length, the grade of which was 317 feet to the mile, with 10' curvature. The switch-back was operated about nine months, ending with the completion of the tunnel in September last, when it was taken up. Since commencing work, the engine 'Uncle Dick' has been in constant service, except that it has gone into the shops once or twice for slight repairs, and has made over 52,000 miles. The paper wheels have not been renewed, and are still in good condition and capable of much more work than they have already done. We are so well satisfied with their service that we shall equip our engines and coaches with them as rapidly as possible, and use them exclusively over our heavy mountain grades."

THREE handsome passenger cars have just been completed at the Norwich shops of the New York & New England road, under the supervision of the Master Car-Builders, Mr. J. W. Marden. They are designed more for convenience and comfort than for the display of elegant interiors. The windows are 19 x 30 inch glass; each car is lighted by three double Howard lamps; there is an abundance of ventilation; the door-windows let down at the top. One of the three is a combined baggage and smoking car, with private closets for conductor and baggage master, and a stow-away for oil-cans and tools. The running-gear is of the best, and after several days' trial, the cars are pronounced the easiest and pleasantest riding passenger cars on the road.

C. C. HOUGHTON & SONS, 8 Howard street, are supplying a number of car shops with quartered oak veneers used in the new style of head-linings. They have also a large stock of cabinet woods used in car finishing.

**Elevated Railway Journal.**—We have heretofore omitted to notice this valuable addition to railway journalism. It is published weekly, and contains lively and interesting editorial and miscellaneous matter, and a general summary of railway news that is exceedingly attractive and readable. As an evidence of its enterprising management, the thirteenth number appears in a new dress and very much enlarged. Published by the Elevated Railway Journal Publishing Association, 37 Park Row, New York. Mr. V. A. Krepps, Business Manager. Price \$1.00 a year.

A new partnership, to run the Weimer Machine Works at Lebanon, Pa., has been formed and begun business June 1. The new company will consist of P. L. Weimer, L. E. Weimer, Elizabeth Weimer, Weimer Sunde, and Asa P. Weimer. Car-building will again be taken up, and the car department, which has been lying idle for several years, will soon be in active operation, which, together with the heavy furnace orders on hand, will make matters lively at the old works.

**CAR SEAT SPRINGS.**—Every body appreciates a comfortable and luxurious seat in passenger cars, and this requirement seems to have been met in the "Level-Tempered Seat Springs" of the Detroit Car Seat Spring Co. The steel used is of the finest imported quality, and the flexibility of the springs makes them conform equally well to a flat

or convex seat. No webbing is used to hold them in place; they retain their original shape; do not settle or cause any breaks in the upholstery, and can be used in repairs as well as in new work. Only about half the usual quantity of hair is used, and the springs are guaranteed against breakage. Seats that have been in service since 1872 are still in first-class condition. It is claimed by the manufacturers that as compared with other seats, there is a saving of more than a dollar a seat.

THE West Bergen (N. J.) Car Spring Works are now in full operation. Their machinery equipment is new and most complete in every detail, affording facilities for turning out at the shortest notice every kind of railway car springs. Mr. C. D. W. Gibson (formerly of the National Car Spring Co.) is now associated with Mr. Curran Dinmore in representing the works. Office No. 5 Dey street, New York.

THE National Car Spring Co., of New York, has recently increased its facilities for the manufacture of car springs, and is now ready to fill large orders with the utmost dispatch.

WALLACE & SONS, of No. 89 Chambers street, New York, report a reduction in price of brass and copper tubes, sheet copper, copper bolts, brass and wire.

THE Philadelphia & Erie Railroad intends to erect a car shop at Erie.

#### Our Directory.

We note the following changes since our last issue. Readers are requested to give us prompt notice of changes when they occur:

**Central of Georgia.**—Mr. W. F. Shellen has been appointed Superintendent in place of Mr. W. G. Raoul, chosen Vice-President.

**Cherokee.**—Mr. C. E. Scruton, formerly of the Springfield Southern, has been appointed Master Mechanic, vice P. J. Bracken, resigned.

**Chicago & Northwestern.**—Mr. J. S. Oliver, Superintendent of the Iowa Division, has been appointed General Superintendent of the road, and Mr. J. M. Whitmore succeeds Mr. Oliver on the Iowa Division.

**Chicago & Iowa.**—Mr. Geo. Alexander has been appointed General Superintendent. He has, heretofore, been a Division Superintendent of the Chicago, Burlington & Quincy.

**Cleveland & Marietta.**—This is the name of the reorganized Marietta, Pittsburg & Cleveland Railroad. Mr. S. C. Baldwin is Vice-President and Manager; office at Marietta, Ohio.

**Kansas City, St. Joseph & Council Bluffs.**—Mr. G. W. P. Atkinson has resigned the position of Purchasing Agent for this road—Kansas City, Fort Scott & Gulf, and Kansas City, Lawrence & Southern.

**Louisville & Nashville.**—Mr. W. H. Thomas is the Master Mechanic of the Nashville & Decatur, and Evansville, Henderson & Nashville Divisions, vice Mr. E. M. Humstons, resigned. Mr. Thomas has heretofore been on the Mobile & Montgomery road.

**New York & Greenwood Lake.**—Mr. Wm. P. Harris has been appointed Managing Director, vice Mr. C. W. Douglas, Superintendent, resigned.

**New York & New England.**—Mr. E. M. Humstons (late of the Louisville & Nashville) has been appointed Master Mechanic of the Hartford Division, with headquarters at Hartford, Conn.

**New York, Ontario & Western.**—Mr. N. R. Hanks has been appointed Superintendent, and Mr. Charles Clark, Purchasing Agent, with headquarters at Middletown, N. Y.

**New York, Pennsylvania & Ohio.**—The office of the General Master Car-Builders, Mr. J. H. F. Wiers, has been removed from Massville, Pa., to Cleveland, Ohio.

**Northeastern (South Carolina).**—Mr. John F. Divine has been appointed Superintendent. He is also Superintendent of the Cheraw & Darlington; Wilmington, Columbia & Augusta; and Wilmington & Weldon roads.

**Northeastern, of Georgia.**—Major H. R. Bernard has been appointed Superintendent, in place of Mr. Edwards, who has gone to the Macon & Brunswick.

**Portland & Rochester.**—Mr. J. M. Lunt having resigned the office of Superintendent, its duties will be performed by Mr. Geo. P. Westcott, Receiver and President.

**Selma & Greensboro.**—Mr. A. M. Fowlkes (formerly receiver) has been appointed Superintendent, in place of E. W. Rucker, resigned.

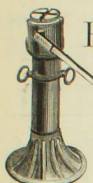
**South Pacific Coast.**—Mr. DeLancey Stone has resigned the position of Purchasing Agent of this road.

**Western North Carolina.**—The purchasers of this road have appointed Col. A. B. Andrews Superintendent. He is also Superintendent of the Richmond & Danville road.



**RICHARD DUDGEON,**  
No. 24 Columbia St., New York.

MAKER AND PATENTEE OF IMPROVED



**Hydraulic Jacks,  
PUNCHES,  
Boiler-Tube  
Expanders,**

AND  
**DIRECT ACTING  
STEAM HAMMERS.**  
JACKS FOR PRESSING ON CAR-WHEELS OR CRANK-  
PINS MADE TO ORDER.

Communications by letter will receive prompt attention.

## French's Celebrated Plumbago Oils.

The only Oils which will hold Plumbago in absolute suspension in any climate and for any length of time.

The Most Perfect Lubricants known for Railroad Car Journals, Heavy Bearings, Fast-Running Machinery, Cylinders, etc.

These Oils have been thoroughly tested in comparison with a number of the best known lubricants, by **Prof. R. H. Thurston**, in charge of the Department of Engineering, Stevens Institute of Technology, Hoboken, N. J. Prof. Thurston reports that, gallon for gallon, **French's Plumbago Oil**, for railroad service.

Is worth 4.82 times as much as Sperm Oil.  
" 12.33 " " " Lard Oil.  
" 9.25 " " " W. Va. Oil.  
" 15.51 " " " Ordinary Reduced Black Oil.

With the further advantage to our Plumbago Oils of little tendency to gum, and entire freedom from Acid.  
EXTRACT FROM REPORT OF PROF. THURSTON.

THE "FRENCH'S PLUMBAGO OILS" thus appear to possess those much-sought-for qualifications which are practically necessary to the complete realization of the great advantages in lubricating and cooling, possessed by Plumbago as a lubricant. Very respectfully, R. H. THURSTON.

The following are a few out of hundreds of practical tests with our oils:

H. WATKEYS, SUPT. MOTIVE POWER, N. Y. C. & H. R. R. Western Division, RAN THE TENDER OF ENGINE 189 (EAST PASSENGER) THREE AND A HALF MONTHS, 150 miles per day, or ABOUT 15,000 MILES, WITH ONE OILING WITH OUR PLUMBAGO COACH OIL, and states that it would have run longer, but engine was stopped to put under new wheels.

PASSENGER CAR 130 ON THE N. Y. C. & H. R. R. RAN 2040 MILES WITH ONLY ONE OILING WITH OUR PLUMBAGO COACH OIL, AND NO OTHER OIL USED.

WAGNER SLEEPING-CAR NO. 40 ON SAME ROAD, RAN 10,000 MILES WITH ONLY ONE OILING OF SAME, AND NO OTHER OIL USED.

WAGNER DRAWING-ROOM CARS "CITY OF ROME" AND "COLUMBIAN" RAN ON N. Y. C. & H. R. R. EACH 10,000 MILES WITH ONE OILING.

A. E. CHAPMAN, MASTER MACHINIST, CLEVELAND, PITTS. B. R. CERTIFIES THAT HERMAN COACH NO. 35 ON THAT ROAD 33,470 MILES WITH ONE OILING OF OUR COACH OIL.

W. F. TURBEFF, MASTER MECHANIC, CLEVELAND, TUSCARAWAS VALLEY & WHEELING R. R. CERTIFIES THAT COACH NO. 8 RAN ON THAT ROAD 34,400 MILES WITH ONE OILING OF OUR PLUMBAGO COACH OIL.

**THE PLUMBAGO OIL CO.,**

P. O. Box No. 8, Rochester, N. Y.

Send for Circular and Report of Prof. Thurston.  
S. D. McILLAN, President, Cleveland, O.  
C. T. HAM, Vice-President, Rochester, N. Y.

**C. C. C. W.**  
**CAYUTA CHILLED CAR WHEELS,**



MANUFACTURED BY

**CAYUTA WHEEL AND FOUNDRY COMPANY,**  
WAVERLY, N. Y.,  
SAVILE, PA.

REGINALD CANNING, Superintendent.

A. B. HULL, President.

GEO. WESTINGHOUSE, JR.,  
PRESIDENT.

T. W. WELSH,  
SUPERINTENDENT.

JOHN CALDWELL,  
TREASURER.

W. W. CARD,  
SECRETARY.

H. H. WESTINGHOUSE,  
GENERAL AGENT.

## THE WESTINGHOUSE AIR-BRAKE COMPANY,

PITTSBURGH, PA., U. S. A.,

MANUFACTURERS OF THE

**WESTINGHOUSE AUTOMATIC BRAKE,  
WESTINGHOUSE LOCOMOTIVE DRIVER BRAKE,  
VACUUM BRAKES (Westinghouse & Smith Patents),  
WESTINGHOUSE AIR BRAKE.**

Particular attention is called to the "AUTOMATIC" and "LOCOMOTIVE DRIVER BRAKES," now being tested and adopted by the prominent lines.

With the "DRIVER BRAKE" the engineer can handle an ordinary freight train better than with brakemen. The saving in car wheels and wages will therefore be apparent. On shifting or yard engines it is invaluable.

The "AUTOMATIC" has proved itself to be the most efficient train and safety brake known. Its application is instantaneous; it can be operated from any car in the train, if desired, and should the train separate, or a hose or pipe fail, it applies automatically. A GUARANTEE is given customers against loss from PATENT SUITS on the apparatus sold them.

FULL INFORMATION FURNISHED ON APPLICATION.

## VAN LIEW'S GRAIN DOOR PATENTS,

Viz.: "Self-Operating," "Nail Proof," "Socket," and "Hissell & Miller Patents."

1. Self-supporting, and carried where needed.
2. Very easily operated, and always in place.
3. Two fingers will take down and Lock for use.
4. One hand will raise it, and hang it up again.
5. Always secured, and "cannot be stolen or lost."
6. Safely locked, and "cannot lose grain."
7. Adapted to any sized Door, in any Railroad Car.
8. Always in Order, and "Care over ready for use."
9. Now Improved, Simplified and Complete.

**D. F. VAN LIEW, Patentee,**

(P. O. Box 172.)

Aurora, Illinois.

C. & N. W. - C. A. & St. L.

Wab. St. L. & P. - Kas. Pac.

REFERENCES:

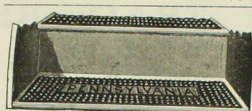
M. K. & T. - K. C. St. J. & C. B.

Grand Trunk - L. E. & W., etc.

Mo. Pac. - P. Ft. W. & C.

Union Line - P. C. & St. L.

K. C. P. S. & G. - A. T. & S. F.



## RUBBER PLATES FOR CAR STEPS,

MANUFACTURED BY

Rubber Step Manufacturing Co., 43 Haverhill St., Boston.

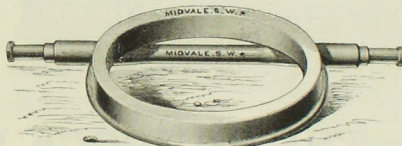
Accidents from slipping prevented; icy steps avoided. The elasticity of the rubber breaks the ice when stepped upon.

SEND FOR CIRCULAR.

## MIDVALE STEEL WORKS.

Works and Office: NICETOWN, PHILADELPHIA, PA.

TIRES,  
LOCOMOTIVE  
& CAR WHEEL.



Every Description.  
AXLES

## HEAVY CASTINGS AND FORGINGS.

Tool-Machinery and Spring Steel.

## HOOPES & TOWNSEND,

1330 BUTTWOOD STREET,

Philadelphia, Pa.,

MANUFACTURE

## MACHINE, CAR, AND BRIDGE BOLTS,



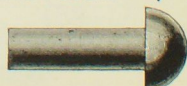
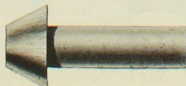
**SQUARE  
AND  
HEXAGON NUTS,  
WASHERS,  
TANK  
AND  
COOPERS'**



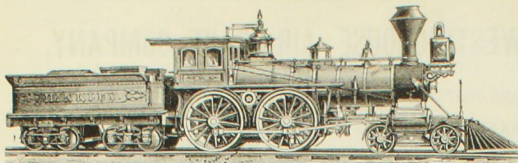
**TAP BOLTS,  
WOOD SCREWS,  
SWIVELS,  
RAILROAD**



**TRACK BOLTS,  
RIVETS, COLD PUNCHED,  
CAR FORGINGS,  
"KEYSTONE" BOILER RIVETS**







## HINKLEY LOCOMOTIVE COMPANY.

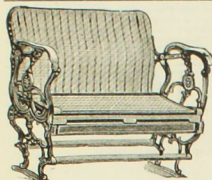
(ESTABLISHED IN 1839.)

439 ALBANY ST., BOSTON, MASS.

This Company, having been reorganized, is prepared to receive orders for Locomotive Engines and Tenders, Boilers and Tanks, and to execute such orders promptly at fair prices for the best work.

FRANKLIN D. CHILD, Superintendent.

GREELY S. CURTIS, Treasurer.



## NEW "COMBINATION" CAR SEAT.

Made of Woven Cane cemented to Canvas. Strongest on Earth. Most Durable. 3,000 lbs. strength. Will not break through.

ELASTIC, COMFORTABLE AND SUPERIOR.

Warranted as represented. We refer to any STREET RAILWAY in Philadelphia, or any COMPETENT JUDGES, as being the Strongest and Most Durable Seat ever made.

Don't fail to examine and try it. Made only by

HALE & KILBURN M'F'G CO.,  
48 and 50 North Sixth St., Philadelphia, Pa. Send for Particulars.

## BUY CARTER'S INK

AND

MUCILAGE.

NO. 36 DEY STREET, NEW YORK.

## EAMES VACUUM BRAKE CO., RAILWAY TRAIN BRAKES,

P. O. Box 2878.

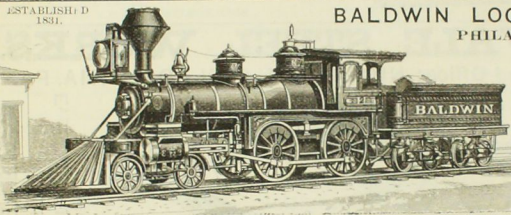
SALES OFFICE, 15 GOLD ST., NEW YORK.

Represented by THOMAS PROSSER & SON

THE EAMES VACUUM BRAKE is confidently offered as the most efficient, simple, durable, and cheapest-power Brake in the market.

CAN BE SEEN IN OPERATION UPON OVER FIFTY ROADS.

ESTABLISHED  
1851.



## BALDWIN LOCOMOTIVE WORKS, PHILADELPHIA, PA.

Annual  
Capacity, 450.

BURNHAM, PARRY, WILLIAMS & CO., PROPRIETORS,

GEO. BURNHAM,  
CHAS. T. PARRY,  
EDWARD H. WILLIAMS.

MANUFACTURERS OF WM. P. HENSZLEY,  
EDW. LONGSTRETH,  
JOHN H. CONVERSE.

LOCOMOTIVE ENGINES.

Adapted to every variety of service, and built accurately to standard gauges and templates. Like parts of different engines of same class perfectly interchangeable. Passenger and Freight Locomotives, Mine Locomotives, Narrow Gauge Locomotives, Steam Street Cars, etc.

Illustrated Catalogues furnished on application of customers. All work thoroughly guaranteed.

R. E. RICKER & CO., New York Agents,  
Rooms 34, 35 and 36, Coal and Iron Exchange Building.

## THE HANCOCK INSPIRATOR

IS THE

INJECTOR PERFECTED.

THE BEST FOR FEEDING

LOCOMOTIVE, STATIONARY, AND MARINE BOILERS.

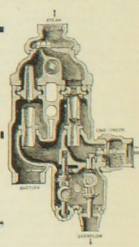
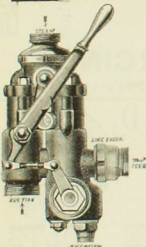
No Movable Parts. Drafts Water 25 Feet.

NO ADJUSTMENT FOR VARYING STEAM PRESSURE.

SEND FOR CIRCULARS TO

THE HANCOCK INSPIRATOR CO.

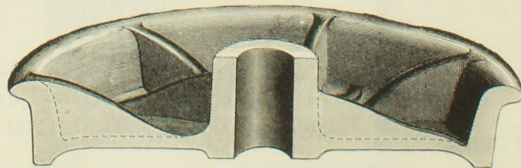
34 Beach Street, Boston.



## BALTIMORE CAR WHEEL COMPANY.

W. S. G. BAKER, President.

J. M. LAWFORD, Secretary.



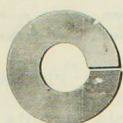
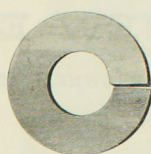
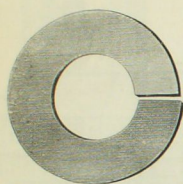
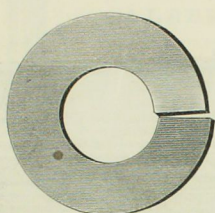
Manufacture Chilled Wheels of all patterns and sizes for every service, by an improved method of casting, securing a deep and uniform chill, with soft plate and round form, free from strain and tread defects.

Works, Corner Essex and Burke Streets, Canton, Baltimore.

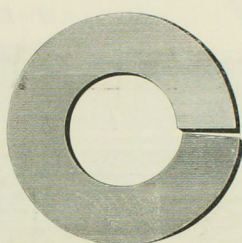


# THE VERONA TOOL WORKS,

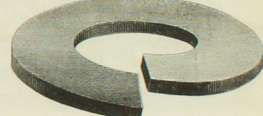
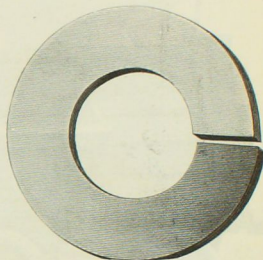
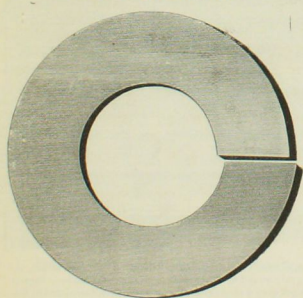
Manufacturers of the Patent Verona Spring Washers of the following sizes:

For  $\frac{1}{8}$  inch Bolt.For  $\frac{3}{16}$  inch Bolt.For  $\frac{1}{2}$  inch Bolt.For  $\frac{5}{8}$  inch Bolt.For  $\frac{7}{8}$  inch Bolt.

For 1 inch Bolt.



For 1 inch Bolt.

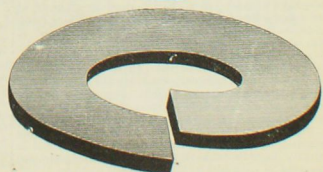
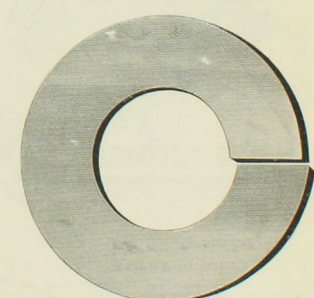
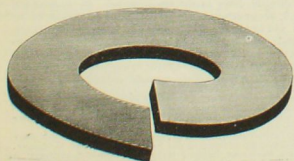
For  $1\frac{1}{2}$  inch Bolt.For  $1\frac{1}{2}$  inch Bolt.

**METCALF, PAUL & CO.,**

PITTSBURGH, PA.

Branch Office: 40 Dearborn St.,

CHICAGO, ILL.





# THE SCREW LEVER DUMP CARS,

Especially for Dumping Long Gondola, Flat and Grain Cars.

PATENTED BY MATTHEW VAN WORMER, DAYTON, OHIO.

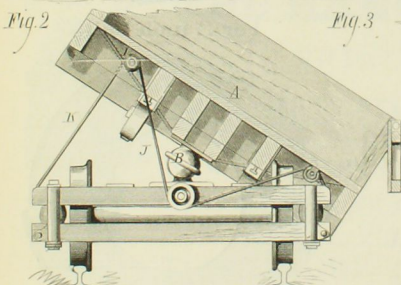
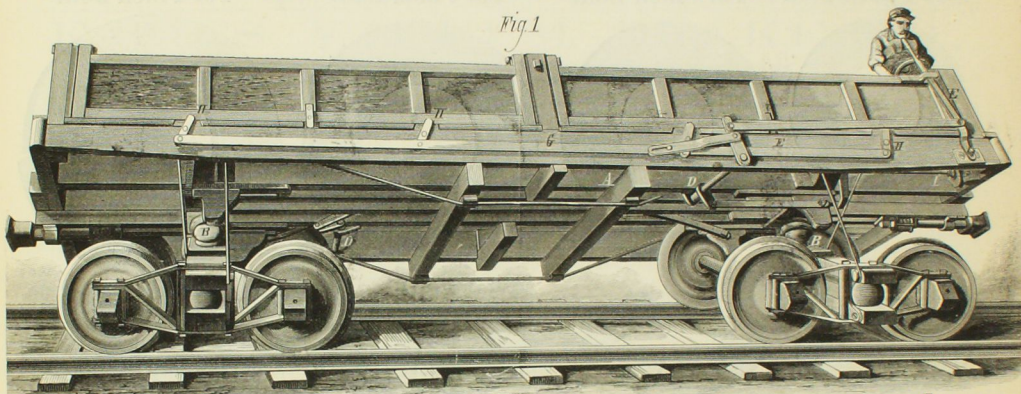
## THE NEW ENGLAND CAR COMPANY

SIMEON BROWNELL, Managing Agent.

FRANK BROWNELL, Treasurer.

Sole Owners for New England, and Sole Agents for the United States.

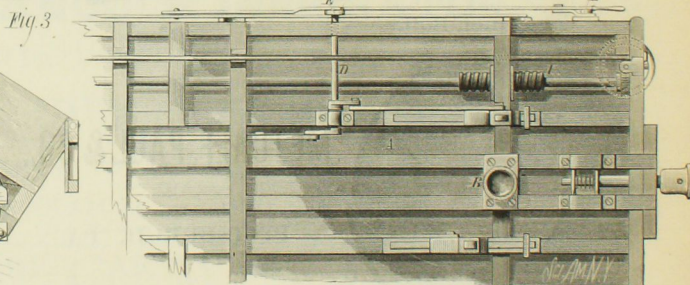
No. 48 CONGRESS STREET, BOSTON, MASS., U. S. A.



NEW DUMP CAR.

We present herewith engravings of a new dumping car, patented by Mr. Matthew Van Wormer, of Dayton, O., and now being introduced by the New England Car Company, of 48 Congress street, Boston, Mass. This car possesses many points of novelty which are covered by separate patents. It has been improved from time to time until, as it now stands, it appears to fulfill all the requirements. In its construction it is as simple as well as when all of its functions are considered. It is a full-sized gondola car, and capable of running with the same steadiness and security as the ordinary cars of the same size, while at the same time it is as perfectly manageable as a common dumping-wagon.

Fig. 1 shows the entire car in perspective while being dumped; fig. 2 is a vertical transverse section, taken just in front of one of the trucks; and fig. 3 is an inverted plan view, showing the apparatus for moving the side bearings.



This operation removes the side bearings of one side of the car and puts it in position to be dumped. Upon the outer end of the rock shaft there is a lever, E, which is connected with the lever, F, at the side of the car near its end. The lever E is connected with a bar, G, extending along the side of the car, and pivoted to four or more lever catches, H, which hold the side doors of the car in position to retain the load. By this arrangement of the levers and their connections the car doors may be released and the supports, B, moved, making the car ready to dump. The apparatus for dumping the car is very simple and effective, and capable of holding the car platform at any desired angle. It consists of a long shaft, I, extending along the body of the car, and provided at one end with a worm-wheel, which is engaged by a worm on a vertical shaft extending upward through the platform of the car, and provided with a lever or wheel by which it may be turned.

Upon drums carried by the shaft, I, are two drums, upon

each of which are wound two chains, J, K. The chain, J, runs downward over a sheave on the truck timber, thence upward over a sheave on the car body, then downward to the end of the truck timber, where it is secured. The chain, K, runs directly down to the truck timber. By turning the shaft, I, in one direction the car is dumped on one side of the track, and by turning it in the other direction the load is discharged on the opposite side of the track. This result is secured by winding one of the chains, J, K, while the other is unwound. The worm gear affords ample leverage for operating the shaft, I, so that the car may be dumped by one man standing on the platform.

The merits of this dumping car will be understood and appreciated by railroad engineers, superintendents and managers, who are familiar with the imperfections of the ordinary cars.

Any further information in regard to this invention may be obtained by addressing the New England Car Company, 48 Congress street, Boston, Mass. Mr. Simeon Brownell is general manager and sole agent for the United States.



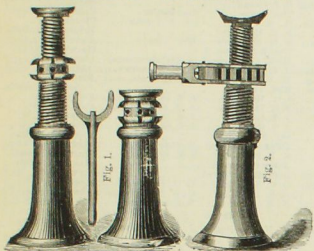
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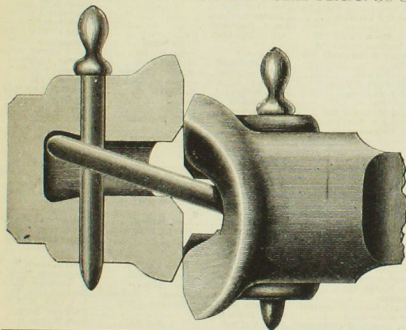
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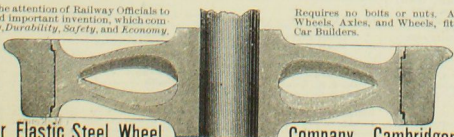
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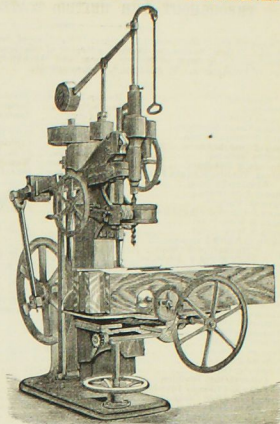


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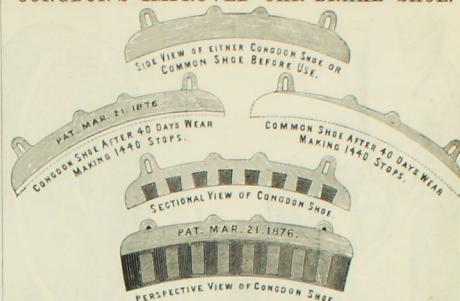


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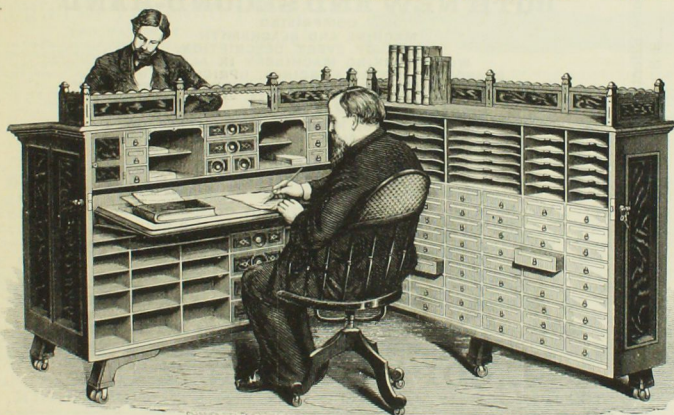


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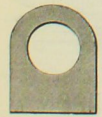
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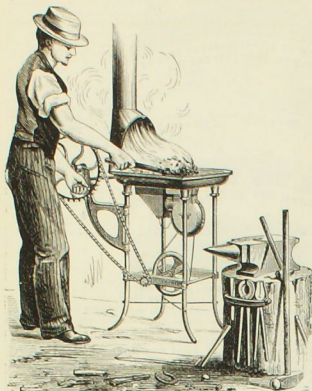
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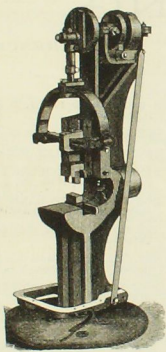


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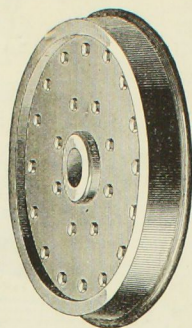
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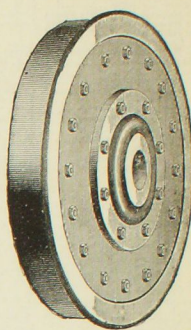
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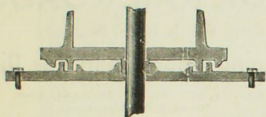
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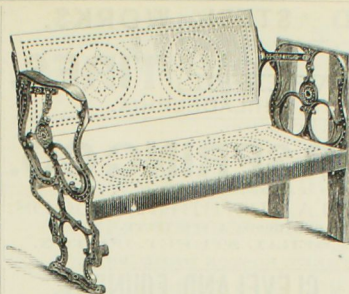
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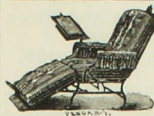
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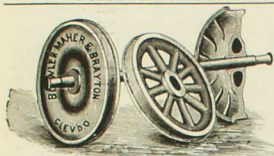
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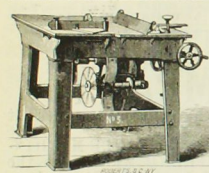


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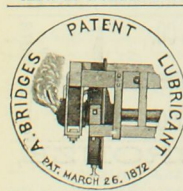
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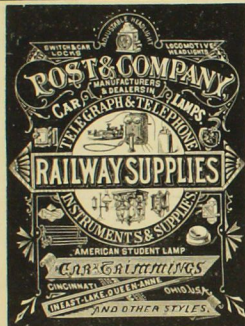
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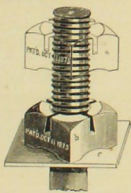
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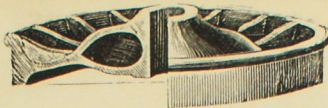
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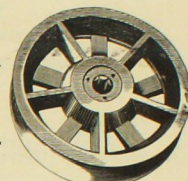
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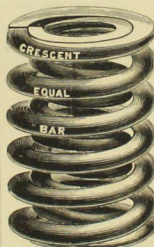


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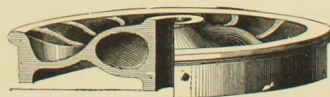
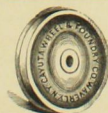
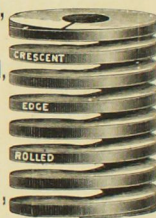
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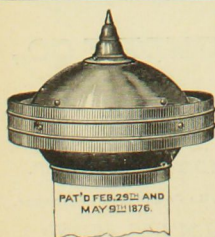
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